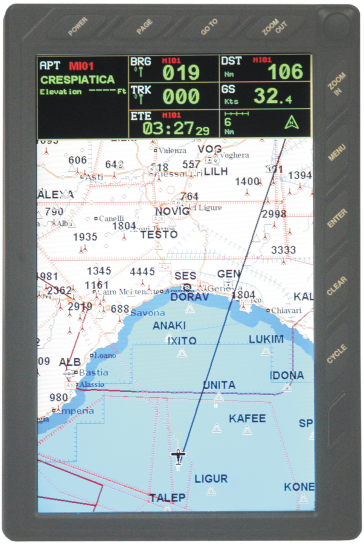
AvMap SATELLITE NAVIGATION GPS Charting Systems

EKP-IV

User Manual



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WARRANTY

AvMap warrants their GPS receiver and accessories to be free of defects in material and work-manship for a period of two years from the date of original purchase. This warranty applies only to the original purchaser of this product.

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. Finishes

. Defects resulting from installation

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(I) _____ **Attenzione!** *L'esposizione del display ai raggi ultravioletti può accorciare la vita dei cristalli liquidi usati nel vostro plotter cartografico. Questo limite è dovuto alla tecnologia costruttiva degli attuali display. Evitare inoltre che il display si surriscaldi per non causare una diminuzione di contrasto che, in casi estremi, può rendere lo schermo completamente nero. Tale condizione è comunque reversibile durante il raffreddamento.*

(GB) _____ **Warning!** *Exposure of display to UV rays may shorten life of the liquid crystals used in your plotter. This limitation is due to the current technology of the LCD displays.*
Avoid overheating which may cause loss of contrast and, in extreme cases, a darkening of the screen. Problems which occur from overheating are reversible when temperature decreases.

(D) _____ **Achtung!** *Ultraviolette Strahlen können die Lebensdauer vom Flüssigkristalldisplay verkürzen. Die derzeitige LCD-Technologie bedingt diese verkürzte Lebensdauer.*
Überhitzung des Displays durch Sonneneinstrahlung führt zu einem Kontrastverlust und in extremen Fällen sogar in eine Schwär zung des Bildschirmes.
Bei sinkenden Temperaturen normalisiert sich der Kontrast wieder und die Bildschirminformation wird wieder ablesbar.

(F) _____ **Attention!** *L'exposition de votre écran LCD aux ultra-violets lors de soleil intense réduira la durée de vie de l'afficheur de votre lecteur. Cette contrainte est liée à la technologie des écrans LCD. Une augmentation trop importante de température peut obscurer des zones de votre écran et le rendre ainsi inutilisable (non couvert par la garantie).*

(E) _____ **Aviso!** *La exposición de la pantalla a los rayos UV puede acortar la vida del cristal líquido usado en su ploter. Esta limitación se debe a la tecnología actual de las pantallas LCD.*
Evitar que la pantalla se caliente en exceso pues puede causar pérdida de contraste y, en caso extremo, la pantalla puede quedar totalmente negra. Este problema revierte al enfriarse la pantalla.

Warning!!!

A measure of knowledge by the user is required for proper and safe use of the chart plotter. Read the User Manual and the Warranty completely.

Use Good Judgement

This product is an excellent navigation aid, but it does not replace the need for careful pilotage and good judgement. Never rely solely on one means of naviga-tion.

Use Care to Avoid Inaccuracies

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and the maintenance of GPS. Certain conditions can make the system less accurate.

Accuracy can also be affected by poor satellite geometry.

The accuracy of position fixes is subject to changes in accordance with the Department of Defense civil GPS user policy and the Federal Radionavigation Plan.

Cleaning Procedure for the Chartplotter Screen

Cleaning of the chartplotter screen is a very important operation and must be done carefully. Since the surface is covered by a antireflective coating, the procedure for cleaning all the surfaces can be performed using the following procedure: You need a tissue or lens tissue and a cleaning spray containing Isopropanol (a normal spray cleaner sold for the PC screen, for example PolaClear by Polaroid). Fold the tissue or lens tissue into a triangular shape, moisten the tip and use the index finger behind a corner to move the tissue across the surface, in overlapping side to side strokes. If the tissue is too wet, a noticeable wet film will be left in its path and you will need to repeat the process. If too dry, the tissue won't glide easily, and may damage the surface.

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1 Introduction

If you have not used a GPS Charting System before and intend to use your EKP-IV for navigating, we suggest that you read this User Manual and make sure you are familiar with its contents.
Throughout this User Manual, the keys are shown in capital letters enclosed between single inverted commas, for example 'MENU'.
Menu operations are in bold characters listed by keys sequence with the menu names enclosed between quotes, for example **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER'** means: press and hold down the 'MENU' key for 1 second, using the cursor key selects the System Setup menu, press 'ENTER', using the cursor key selects the Fix Setup menu and then press 'ENTER'.

1.1 FEATURES

This electronic charting system integrates the remarkable accuracy of a GPS receiver with a detailed moving map into a single, easy-to-use, computerized electronic map system. Designed as a sophisticated navigation information center, the features of the EKP-IV allow the user to Track information and navigate to points of interest.
Equipped with C-MAP NT + cartography, the EKP-IV system can be used either with a C-MAP NT + Compact Flash (data card) or as a Track plotter using the internal background map.
The EKP-IV can be connected to an external GPS or position receiver via a data cable providing an NMEA0183 data string. Connections to an external receiver, device or an external antenna are made quickly and easily while in the cockpit (see Chapter 15).
The EKP-IV contains built-in cartography with coastlines, names of countries, major cities, highways, lakes and rivers. Additional street, lake and river detail, which enhances the internal data, can be obtained with C-MAP Aviation's regional terrestrial library.
When the package containing the EKP-IV is first opened, please check it for the following contents (if any parts are missing contact the dealer where you purchased the EKP-IV):
- C-MAP Navdata Compact Flash
- Antenna and 5 meter cable with SMB connector

• Power Cable (with cigarette lighter adapter)
• Velcro Leg Strap
• User Manual

Optional Accessories:
• C-Map NT + Regional Compact Flash
• PC/Data cable
C-Map NT + Compact Flash (cartography and aeronautical data cards) are available through your local dealer. For additional information on C-MAP Cartography visit our web site at: **http://aviation.c-map.com**.

1.1.1 SPECIFICATIONS

MAIN CHARACTERISTICS

Recordable Individual points
• Waypoints :1000
• Type of User Waypoint Icons :16
Flight Plans
• Flight Plans :10
• Max Waypoints per Flight Plan :100
Tracking
• Tracks :1
• Track Colors :7
• Points per Track :5000
• Step by Distance :Auto, 20, 100, 500 Mt, 1Km; 5, 30 Sec, 1 Min
Cartographic Functions
• Worldwide Background
• Built-in Continental Cartography
• Coordinates System (DDD MM SS, DDD MM.mm, DDD MM.mmm, UTM, OSGB, MGRS)
• North Reference
• Auto Zoom
• Map Presentation (Aero+Terrestrial, Aeronautical, Marine)
POI Settings
• Selective and cycled Display
• VFR (Airports, VOR, NDB, Intersections, Vertical Obstructions, Aero Objects Id, Enroute Communications)
• Airspace (Controlled Areas, Restricted Areas, FIR & UIR, MORA)
• Land (Roads, Road Labels, Railroads, City Names, Rives and Lakes, Cultural Features, Natural Features, Landmarks, POI Objects)
• Marine (Lights, Chart Boundaries, Bathymetric & Soundings, Bathymetric & Soundings Range, Depth Area Limit, Navigational Aids, Attention Areas, Tracks & Routes)

• Other Settings (User Points, Objects Overlap, Lat/Lon Grid)

Fix Functions

• DGPS
• WAAS
• Fix Symbol user selectable (Standard, Plane, Helicopter, Car)
• Static Navigation
• Course Predictor
• Map Orientation (Track-up, Course-up, North-up)
• Projected Radial
• A-B measurement

Data Page Options

• Nav/Location
• HSI Page
• Flight Plan
• GPS Page
• About Page

Special Functions

• Automatic Info (Aero+Terrestrial, Aeronautical, Terrestrial, Marine)
• Nearest search
• Direct-To navigation
• Date and Time Format
• Astronomic Data Calculation (Sun/Moon Info)
• Distance Unit selection (KM, NM, SM)
• Speed Unit selection (MPH, KTS, KMH)
• Altitude Unit selection (FT, FL, MT)
• Depth Unit selection (FT, FM, MT)
• Fuel Unit selection (GAL, LIT, LB, KG, BGAL)
• Descent Rate selection (FT/MIN, M/S, DEG)
• Temperature Unit (C/F)
• Alarms handling (Arrival, XTE, Waypoint Alarm Radius, Airspace)
• Database (Airports,VOR,NDB, Intersections, POI objects, User Waypoints, File Manager)
• Calculator (Countdown Timer, Elapsed Timer, Trip Computer, Vertical Navigation, Wind Calculation, Fuel Consumption)
• Simulation mode (Speed, Heading)
• Checklists (Engine Start, Ground Check, Pre Take-Off, Landing)
• Communications (NMEA Output, Waypoints Upload/Download, Flight Plan Upload/Download, Track Upload/Download)

Interface

• Serial I/O port

PHYSICAL CHARACTERISTICS

Size : 7.1" x 4,8" x 1,8" (2.3")

Weight: 800 g
LCD display
• color TFT 7" (16:9)
• resolution 800 x 480 pixels
Antenna dimensions
• 3" diameter, 0.625" height (76.2 mm diameter, 15.9 mm height) (Antenna includes a 5 meter cable)
Power consumption
• color 10 Watt, 10–35 Volt DC
Operating Temperature Range
• 32°F to 131°F (0°C to 55°C)
Storage Temperature
• -13°F to 158°F (-25°C to 70°C)
Memory
• Non volatile with battery back-up
Keyboard
• Backlighted, silicon rubber

1.2 BASIC

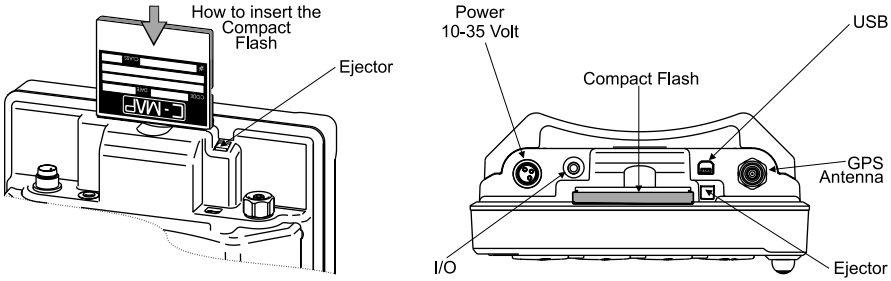


Fig. 1.2 - How to insert the Compact Flash

The EKP-IV is controlled by using 10 keys. As you press a key, a single audio beep confirms the key action; every time the key pressed is not valid, three rapid beeps sound indicating that no response is available.

POWER Key **-** For quick access to the GPS status tap the 'POWER' key. The Brightness and contrast will appear; the GPS status and current time are displayed at the bottom of this box.

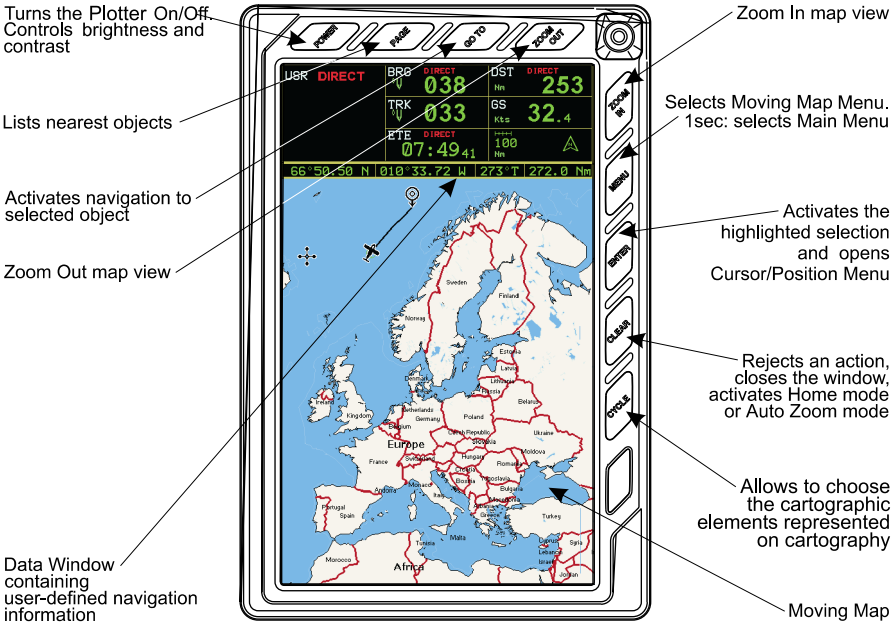


Fig. 1.2a - The EKP-IV

1.3 FLYING START

These pages provide a very brief overview of several of the EKP-IV's important features, the Main Menu, the Moving Map, GoTo flights and locating a Waypoint in the Database. It does not replace the User Manual, which should be read to get the fullest possible use from your EKP-IV.

NOTE

The EKP-IV is an aid to navigation. It does not replace paper charts and good judgement.

1.3.1 THE MOVING MAP

Before starting, connect the EKP-IV to power and place the antenna with a clear view of the sky.

Press 'POWER' to start the EKP-IV. Press 'ENTER' to exit from the Warning page and enter the Moving Map mode. The Moving Map is the default state displaying the Moving Map screen and the Data Window. The Data Window contains navigation information boxes (See Chapter 3 for details on Moving Map mode).

To Change the Scale of the Moving Map
Use 'ZOOM IN' and 'ZOOM OUT' to change the map display scale.

To Select Position
Use the cursor key to scroll to the location you want.

1.3.2 THE MAIN MENU

From Moving Map press 'MENU' for 1 second to display the Main Menu:

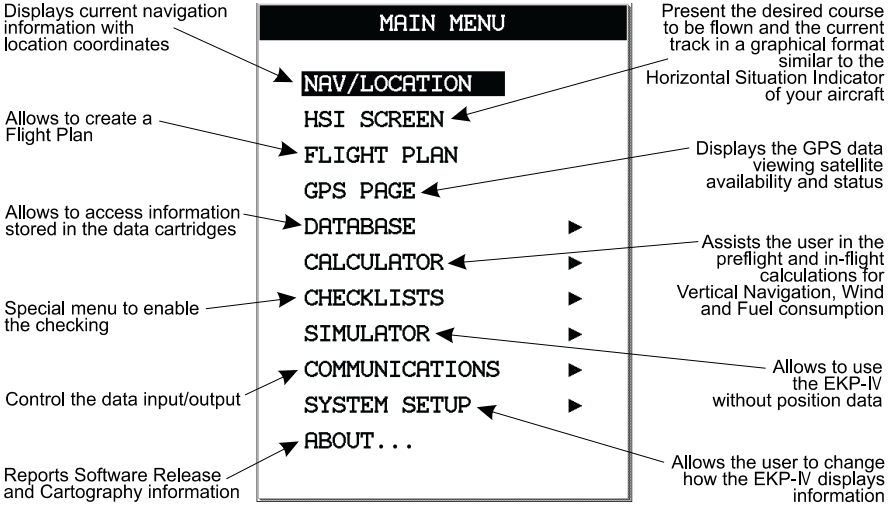

Displays current navigation information with location coordinates
MAIN MENU
NAV/LOCATION
HSI SCREEN
FLIGHT PLAN
GPS PAGE
DATABASE
CALCULATOR
CHECKLISTS
SIMULATOR
COMMUNICATIONS
SYSTEM SETUP
ABOUT...
Present the desired course to be flown and the current track in a graphical format similar to the Horizontal Situation Indicator of your aircraft
Allows to create a Flight Plan
Displays the GPS data viewing satellite availability and status
Allows to access information stored in the data cartridges
Assists the user in the preflight and in-flight calculations for Vertical Navigation, Wind and Fuel consumption
Special menu to enable the checking
Allows to use the EKP-IV without position data
Control the data input/output
Reports Software Release and Cartography information
Allows the user to change how the EKP-IV displays information

Fig. 1.3.2 - Main Menu

1.3.3 MOVING MAP FUNCTIONS

The Moving Map operates in **Auto Hom**e, **Auto Zoo**m, and **Cursor Mod**e. The screen will behave differently based on the mode of operation selected.
The **Auto Home** mode will allow the user to pan away from his present position to view other parts of the map, and return to present position automatically when no buttons are pushed for a pre-determined amount of seconds.
Auto Zoom mode will keep your present position, and your destination in the screen at all times. The screen will automatically zoom in as you get closer. To shut off this function, simply select OFF.
The **Cursor Mode** (OFF Selected) will allow you to move the map to any position to view data or details. To return to your present position, just press 'CLEAR' while in moving map.
The control for these functions is found in the **Moving Map Men**u, under **Auto Position Mod**e.

1.3.4 MOVING MAP ICONS

The following icons are displayed on the Moving Map to represent Waypoints, navigation aids and airports.

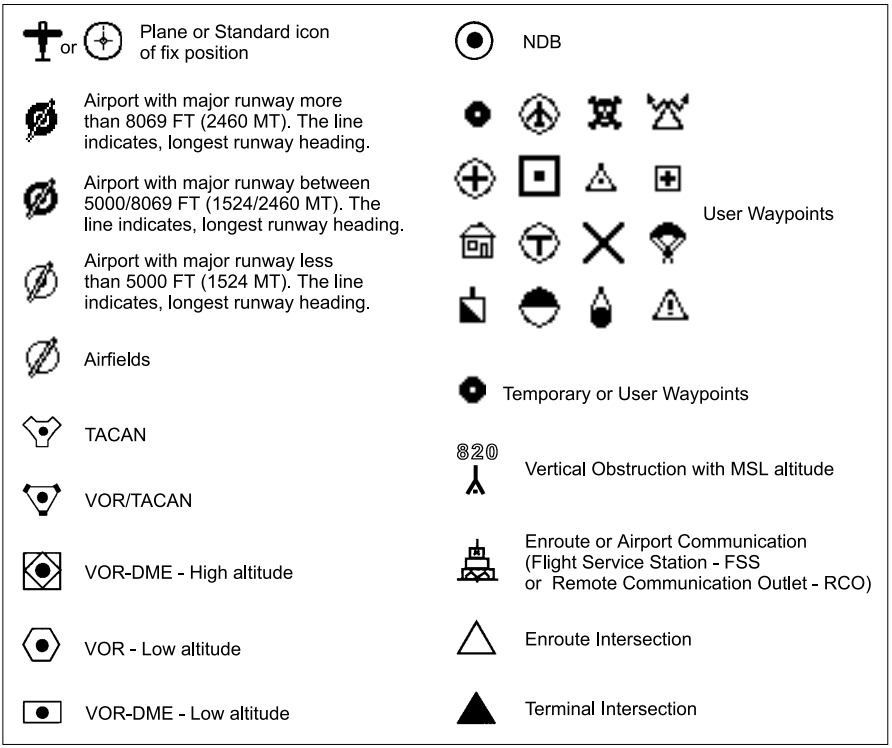

or
Plane or Standard icon of fix position
Airport with major runway more than 8069 FT (2460 MT). The line indicates, longest runway heading.
Airport with major runway between 5000/8069 FT (1524/2460 MT). The line indicates, longest runway heading.
Airport with major runway less than 5000 FT (1524 MT). The line indicates, longest runway heading.
Airfields
TACAN
VOR/TACAN
VOR-DME - High altitude
VOR - Low altitude
VOR-DME - Low altitude
NDB
User Waypoints
Temporary or User Waypoints
820
Vertical Obstruction with MSL altitude
Enroute or Airport Communication (Flight Service Station - FSS or Remote Communication Outlet - RCO)
Enroute Intersection
Terminal Intersection

Fig. 1.3.4 - Moving Map Icons

1.3.5 COURSE PREDICTOR

Indicates the projected position at the set time interval if the current speed and heading are kept. This allows the pilot to correct for wind drift, in real time, right from the moving map.

To select course predictor:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "COURSE PREDICTOR" + 'ENTER'**

1.3.6 GOTO

GoTo sets a 1-leg course from the present position to any location or selected Waypoint.

To activate a GoTo Flight Plan move the cursor to the desired location or

Waypoint and press 'GOTO'. The GoTo menu box will open enabling you to activate the current cursor position or search the Database for a specific object to fly to. To activate the current cursor position, highlight "CURSOR" and press 'ENTER'.
To activate a GoTo Flight Plan to a specific Database item, select the category and press 'ENTER'. Select the database item and press 'GOTO' again to activate.
To deactivate, press 'GOTO' and select "DEACTIVATE".

1.3.7 DATABASE

The Database function allows the user to access information stored in the data cartridges on Airports, VOR's, NDB's, Intersections and User Waypoints. Searching the Database allows the user to activate GoTo Flight Plans and locate the item on the map.
There are two methods of accessing the Database information. The first is through the Database function within the Main Menu and the second is directly from the Moving Map display (see Chapter 3).

2 The Basics

This chapter provides general information about the functions of the keys and entering data (connecting the EKP-IV to power and using the antenna are described in Chapter 15).

2.1 THE KEYBOARD

The EKP-IV has 10 keys, which access and control features. Some keys perform different tasks based on the operation mode. A quick key guide is displayed at the bottom of many menus for easy reference.
Below we indicate the keys in capital letters enclosed between single inverted commas, for example 'MENU'. When a key, for example 'MENU', must be pressed and held down for more than 1 second it is shown as 'MENU' 1 sec.

The Power key
'POWER': press and hold to turn the EKP-IV On.
'POWER' 3 sec.: once the EKP-IV has been turned On turns the EKP-IV Off.
'POWER': (immediately release!) once the EKP-IV has been turned On displays the Brightness and the Contrast Menu.

The Page key
Displays a list of the 20 nearest objects relative to fix position or cursor position if no fix is available.

The GoTo key
Activates a Flight Plan to the cursor position (in Moving Map) or to selected object (in other modes).

The Zoom-Out key
Shows less detail of a larger area by changing the chart scale and zooming out on the map display.

The cursor key
Moves the cursor on the moving map Moving Map, quickly and accurately. Also scrolls to the desired options in menu page(s).

The Zoom-In key
Shows more detail of a smaller area by changing the chart scale and zooming in on the map display.

The Menu key
'MENU': selects the Moving Map Menu.
'MENU' 1 sec.: opens Main Menu (equivalent to press 'MENU' twice).

The Enter key
Selects the desired option or confirms selection. Also opens the Cursor/Position Menu.

The Clear key
Rejects an action, closes a window or activates Home or Auto Zoom mode.

The Cycle key
Allows to choose the cartographyc elements represented on the cartography (for details see par. 3.5.9).

2.2 TURNING THE EKP-IV ON/OFF

Before powering On the EKP-IV, check for the correct voltage (10-35 Volt DC).

2.2.1 TURNING ON

Press and hold 'POWER' for 1 second. The EKP-IV emits one rapid beep sound and a Title page containing information about the Product name, Software version, library version and cartridges installed is displayed. This data can also be viewed in the "About" page in the "Main Menu".

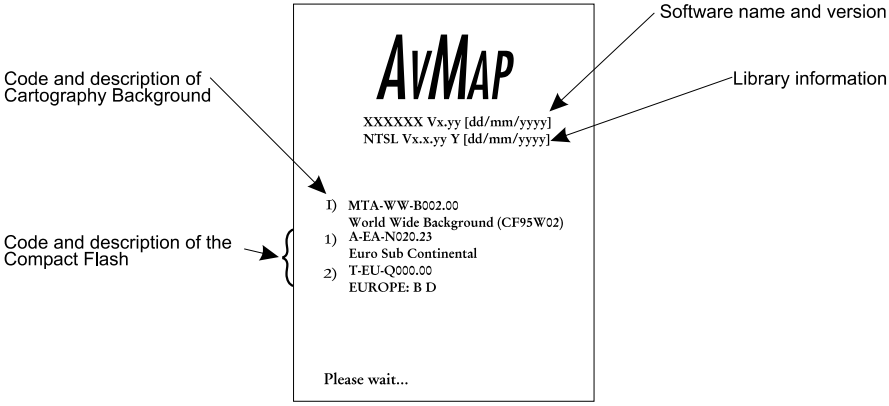


Fig. 2.2.1 - Title page

After a few seconds the Warning page is displayed, reminding you that the EKP-IV is an aid to navigation and should be used with appropriate prudence.

The electronic charts are not intended to substitute for the official charts. Press 'ENTER' to open the Moving Map screen.

2.2.2 TURNING OFF

'POWER' 3 sec.: a countdown timer appears on the screen, if you release the key before the countdown timer reaches zero, the EKP-IV will remain On.

2.3 CHANGING BRIGHTNESS & CONTRAST

Press and immediately release 'POWER' to adjust the brightness and the contrast of the display and keyboard (do not press and hold the key or the "power-off " message will be displayed!).
To increase/decrease the brightness use respectively up/down cursor key. Similarly, to increase/decrease the contrast use left/right cursor key.
Use 'PAGE' to choose Normal Palette and 'MENU' to choose Night palette.
In addition the Time and the GPS State are shown.

2.4 SELECTING THE LANGUAGE

It is possible to select the language in which the information is displayed (for screen labels, menus and options, but it does not affect the map information). The default setting is English.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" + 'ENTER' + "LANGUAGE" + 'ENTER'**

Choose the language you want and press 'ENTER' again to confirm.

2.5 EXTERNAL CONNECTIONS

2.5.1 INTERNAL/EXTERNAL GPS SOURCE

The EKP-IV has an internal GPS Receiver. Be sure the Fix Source is set to Internal GPS to receive data from this internal receiver.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "FIX SOURCE" + 'ENTER'**

Choose Internal GPS and press 'ENTER' to confirm.
Otherwise if the EKP-IV is using an external NMEA0183 positioning source, set the Fix Source as External NMEA0183. The recognized Input NMEA0183 messages are the following: GGA, GLL, GSA, GSV, HDG, HDM, HDT, PCMPA, RMC, VHW, VTG (see Appendix F for more details on NMEA sentences).

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "FIX SOURCE" + 'ENTER'

Choose External NMEA0183 and press 'ENTER' to confirm.

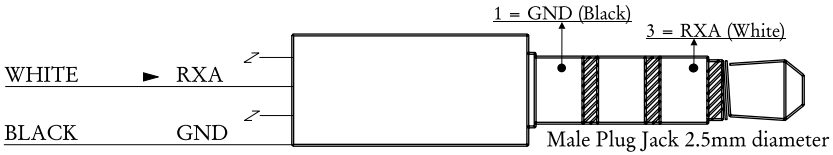


Fig. 2.5.1 - External Input

2.5.2 NMEA OUTPUTS

The EKP-IV can be connected to external equipment that accepts NMEA0183 data input.

Once attached, the output of NMEA formatted position information can be enabled in the following manner:

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "NMEA OUTPUT" + 'ENTER'

The default setting is Off. The Output NMEA0183 messages are the following: APA, APB, BOD, BWC, GGA, GLL, HSC, RMA, RMB, RMC, VTG, WCV, XTE (see Appendix F for more details on NMEA sentences) BOD, BWC, GGA, GLL, HSC, RMA, RMB, RMC, VTG, WCV, XTE (see Appendix F for more details on NMEA sentences).

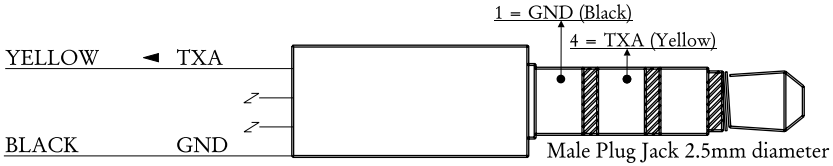


Fig. 2.5.2 - NMEA Connections

2.5.3 DOWN OR UP-LOAD FLIGHT PLANS & TRACKS

The EKP-IV can also send and receive Flight Plans from the C-MAP PC-PLANNER NT + software program or another device compatible with it. This requires an optional power/data cable that can be purchased from your avionics dealer or C-MAP (see Fig. 2.5.3) for a proper connection to the device (see Fig. 2.5.3a).

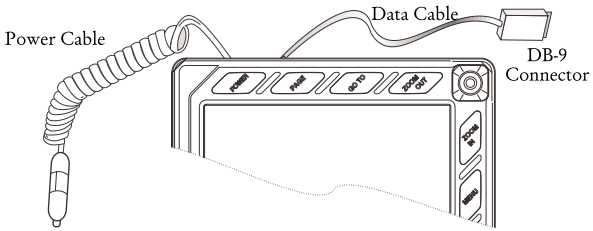


Fig. 2.5.3 - Optional Data Cable

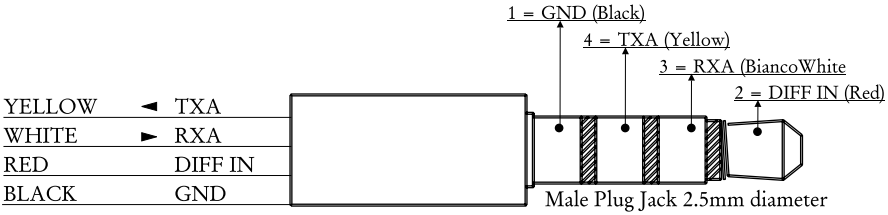


Fig. 2.5.3a - Bi-directional Communicatons

2.5.3.1 Download/Upload Waypoints

The Download Waypoint function allows you to send the current Waypoints to the serial port using the NMEA0183 $WPL sentence (see Appendix F):

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "WAYPOINTS DOWNLOAD" + 'ENTER'

The Upload Waypoint function allows you to receive Waypoints from the serial port using the NMEA0183 $WPL sentence (see Appendix F):

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "WAYPOINTS UPLOAD" + 'ENTER'

2.5.3.2 Download/Upload Flight Plan

The Download Flight Plan function allows you to send the current Flight Plans to the serial port using the NMEA0183 $WPL and $RTE sentences (see Appendix F):

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "FLIGHT PLAN DOWNLOAD" + 'ENTER'

The Upload Flight Plan function allows you to receive Flight Plans from the serial port using the NMEA0183 $WPL and $RTE sentences (see Appendix F):

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "FLIGHT PLAN UPLOAD" + 'ENTER'

The received Flight Plan is saved in the current Flight Plan. If the current Flight Plan contains data the user should be asked to confirm the action (over-writing the existing Flight Plan) or choose another Flight Plan.

2.5.3.3 Download Track

The Download Track function allows you to send Track data from the serial port using the C-MAP Proprietary NMEA0183 $PCMPT sentence (see Appendix F):

> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "TRACK DOWNLOAD" + 'ENTER'

2.6 SYSTEM SETUP OPTIONS

You may select how the EKP-IV displays primary information (such as how time is displayed) from the System Setup Menu.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER'

Refer to Chapter 14 for information about the System Setup Menu.

2.7 DATA ENTRY

Information is keyed into the EKP-IV when editing a Waypoint, entering a Flight Plan, using the calculator and searching the Database. When the field is highlighted:
- Enter or edit data by pressing up/down cursor key to step through the available characters until the desired character is displayed.
- Press right cursor key to move the cursor to the right.
- Use left cursor key to move the cursor to the left.

Some pilot-entered data requires either a +, - or a hemisphere identification:
- Move the cursor over the displayed symbol and press up/down cursor key until the desired symbol appears.
- Press 'ENTER' to continue to the next line or to return to the previous menu.

3 The Moving Maps

The Moving Map is the default state of the software. This mode displays the Moving Map screen and Data Window. The Moving Map displays map detail in Home, Auto Zoom or Cursor mode. The operation mode will determine the options available within the screen. The Data Window contains the navigation information pertaining to the active flight; these fields can be customized.
From the Moving Map screen you can obtain Automatic Info and Full Info for Database objects. Here you can also open the Cursor/Position Menu for features related to Flight Plans, Waypoints and airspace.

3.1 OPERATING MODES

3.1.1 CURSOR MODE

In Cursor mode the screen is controlled by your movement of the cursor. When in Cursor mode, a data field line will appear under the Data Window providing LAT/LON of the cursor position. If a fix has been computed, a distance and bearing will also appear from the position fix to the cursor.
When in Cursor mode it is possible to scroll on the map such that the position fix will not be displayed on the screen. When this occurs, you can quickly display your position by activating Home mode (press 'CLEAR' once). At this time, the system will operate in Home mode (see below Par. 3.1.2).
If you have a position fix, and would like to continue with the cursor at the last position, press 'CLEAR' again (if the cursor key have not been pressed between these two 'CLEAR' presses, the cursor will revert to the original position).
To activate the cursor from the current fix position, simply press the cursor key and the Cursor mode becomes active at the present fix position.
The cursor can be used to create and edit Waypoints and Flight Plans; identify airspace, obtain info about objects, project radial lines and measure distance (see Cursor Menu, Par. 3.6).

3.1.2 HOME (SCREEN AMPLIFIER) MODE

The Home mode (also called Screen Amplifier) is used to keep the fix position within the visible map. The map is scrolled and redrawn automatically as your position moves. When this mode is active the cursor is hidden. When in Home mode, there will be no position line displayed at the bottom of the Data Window.

NOTE

Auto Zoom must be selected to Off in the Moving Map Menu.

A slow flashing airplane icon will indicate your current position. The airplane will be pointing in the direction of movement. Home mode can display the map in North-up, Course-up or Track-up (see Moving Map Settings, Par. 3.5). To deactivate Home mode press 'CLEAR' activating the cursor at the previous position or press a cursor key to enable the cursor under the current fix position.

3.1.3 AUTO ZOOM MODE

The Auto Zoom mode is used to keep the fix position and destination (Target) visible on the map. The map is scrolled and zoomed automatically to keep the best view possible. When this mode is active the cursor is hidden. When in Auto Zoom mode, there will be no position line displayed at the bottom of the Data Window.

NOTE

Auto Zoom must be selected to On in the Moving Map Menu.

To activate Auto Zoom mode press 'CLEAR' in Moving Map. Auto Zoom requires a position fix and an active destination point. If a destination point is not present it works as Home mode.

To deactivate Auto Zoom mode press 'CLEAR' to enable the cursor at the previous position or press a cursor key to enable the cursor under the current fix position. Instead if you press 'ZOOM IN' or 'ZOOM OUT' enables the cursor under the current fix position and zooms on the map.

3.2 DATA WINDOW

The Moving Map screen provides the option for a Data Window display for a user defined navigation information panel. This window is fixed at the top of the screen. During Cursor mode, an additional line is displayed at the bottom of this box with details on the cursor position. See Par. 3.5.3 and 3.5.4 for details on customizing the data fields display.
The data fields window is updated continuously during flight. For full information regarding navigation and GPS data, you can select the Nav/Location screen from the Main Menu (see Chapter 4).
To view A-B BRG and DST, the "Info: A-B Function" must be selected for display in a Data window field.

3.3 AUTOMATIC INFO

Automatic Info will provide details on cartographic objects, Waypoints and navaid items when the cursor is placed over them. This is a user setting that can be defined in Moving Map Menu.
The default is Automatic Information to be displayed for aeronautical and terrestrial data.
When the Cursor mode is active, the Automatic Info window appears on the Moving Map screen if there is an object under the cursor position. Depending on the cursor position the window is opened in the top or bottom of the screen. If additional information is available for the object, the box will indicate with the following message: "Press and hold ENTER to select". By doing so, you will activate the information box and can then select the item using the cursor key (if more than one item is displayed). With the item highlighted, press 'ENTER' again and the additional details will be displayed. If the information is an airport, the 'ENTER' will toggle between the pages of data. Press 'CLEAR' to exit.

3.4 CURSOR OR POSITION MODE

The Moving Map page provides a sub-menu directly related to the cursor or position fix. To activate from the Moving Map press 'ENTER'. The menu displayed will be Cursor or Position dependent upon the map mode (see map mode above). The two menus are displayed on the next page:

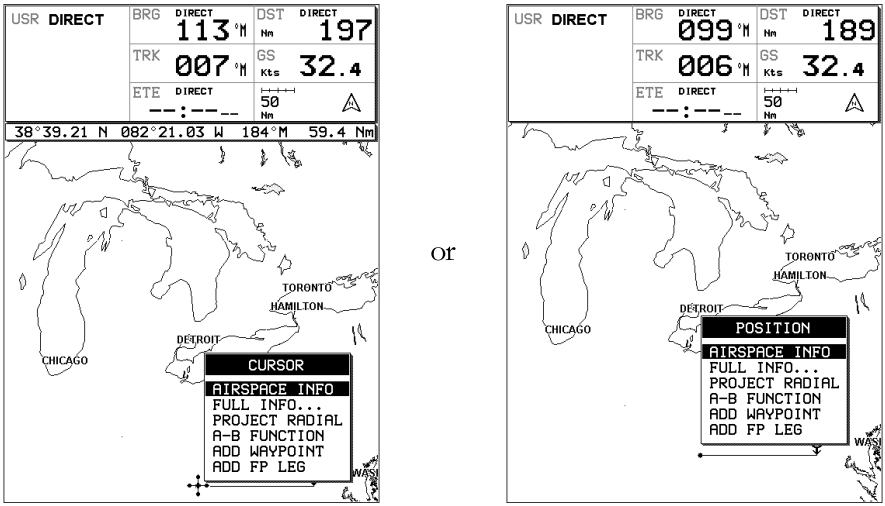


Fig. 3.4 - Cursor/Position Menu

3.4.1 AIRSPACE INFORMATION

Airspace Info will display information about the airspace within the cursor/ position fix. The selected area(s) of airspace queried is highlighted.

>'ENTER' + "AIRSPACE INFO" + 'ENTER'

Like Automatic Info the window is opened in the top or bottom part of the screen.

One window displays all airspace objects. Displayed information is the following: Name of air-space; type of airspace; altitude range; tower frequency for airport traffic areas or main airport frequency for Class B and Class C areas.

3.4.2 FULL INFORMATION

Full Info window displays C-Map attribute information for the object under the cursor/position.

>'ENTER' + "FULL INFO" + 'ENTER'

Found objects are presented using a tree structure. Using the cursor key highlight the object desired and press 'ENTER' for further details.

3.4.3 PROJECT RADIAL

The project radial feature creates a line at a given bearing and distance from a navaid or user waypoint. If no object is present, an error message stating "Object not found" will appear on the screen. The EKP-IV will store 10 radials.

To project a radial, first select the object with the cursor, then:

>'ENTER' + "PROJECT RADIAL" + 'ENTER'

Using the cursor key enter the Bearing and press 'ENTER'. The Distance box is now active; using the cursor key enter the Distance for the line to extend and press 'ENTER'.

To remove a radial, select the object icon or the radial line with the cursor, then:

>'ENTER' + "PROJECT RADIAL" + 'ENTER'

A Warning message appears asking if you would like to remove the radial. Press 'ENTER' to confirm or 'CLEAR' to exit.

To remove all radials stored in the EKP-IV (see also Par. 14.9):

>'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "CLEAR ALL RADIALS" + 'ENTER'

3.4.4 A > B FUNCTION

The A-B Function allows you to calculate distance and bearing between two specified points ("A" and "B"). The distance and bearing will appear in the A-B data field box at the top of the screen. (This must be selected for display; see Data Window, Par. 3.2).

To measure two points:

>Place the cursor at first position "A" + 'ENTER' + "A-B FUNCTION" + 'ENTER'
>Place the cursor at second position "B" + 'ENTER' + "A-B FUNCTION" + 'ENTER'

You can also measure distance from the current fix position using the A-B feature.
From Home or Auto Zoom mode:
>'ENTER' + "A-B FUNCTION" + 'ENTER'
This will place "A" at the current fix position, then:
>Place the cursor at second position "B" + 'ENTER' + "A-B FUNCTION" + 'ENTER'
This line will remain on the screen until it is deactivated. To deactivate:
>'ENTER' + "A-B FUNCTION" + 'ENTER'

3.4.5 WAYPOINT HANDLING

Associate Waypoint with User Waypoint Alarm:

When editing the waypoint, select the icon for the waypoint. Any Waypoint with this icon wil activate a user Waypoint Arrival Alarm if this feature is turned on in the System Setup -Alarm Setup Menu.
The EKP-IV provides storage for 1000 Waypoints. These can be a combination of User Waypoints or Flight Plan Waypoint storage.
User Waypoints can be edited, searched and used as Waypoints within a Flight Plan.
User Waypoints can be created from the Moving Map screen or via the Database page (see Database, Chapter 8 for entering Waypoints from the Database).
Add Waypoint:
>Place the cursor at position + 'ENTER' + "ADD WAYPOINT" + 'ENTER'

Edit Waypoint:

>Place the cursor over Waypoint + 'ENTER' + "EDIT WAYPOINT" + 'ENTER'
The Edit Waypoint box will appear. Using the cursor key scroll through the alphanumerics to create an eight character name, adjust the Latitude or Longitude or select an icon.
Press 'ENTER' within each character field to move to the next field. After completing the icon selection, the box will close and the new data is stored.
Remove Waypoint (present only if there is a Waypoint under the cursor position):
>Place the cursor over Waypoint + 'ENTER' + "REMOVE WAYPOINT" + 'ENTER'
A shadow of the icon will remain on the screen until the map is redrawn.

3.4.6 FLIGHTPLAN

The EKP-IV provides storage for 10 Flight Plans of 100 legs each. From the Moving Map screen you can edit and create Flight Plans using the cursor. The Flight Plan edited or created will be the one that is currently viewed by the software (see Chapter 6).

Creating a Flight Plan

To create a new Flight Plan from the Moving Map screen, be sure the current

viewed Flight Plan (see Chapter 6) is empty. Place the cursor at the desired position on the map, this can be an aero object (APT, VOR, NDB, INT), User Waypoint or a spot on the map.
>'ENTER' + "ADD FP LEG" + 'ENTER'
This will create the first Waypoint within your Flight Plan. Continue this way to add the remaining Waypoints within your Flight Plan.

NOTE

If several aero objects are found under the cursor, the system will default the selection as follows: Airport, VOR, NDB, INT. If no aero object is found, a temporary Waypoint is placed at the coordinates of the cursor and is named "WPTxxx" (where xxx is a number).

Add Waypoint

To add a Waypoint (leg) to the viewed (current) Flight Plan place the cursor over the position.
>'ENTER' + "ADD FP LEG" + 'ENTER'
This will place another leg onto the end of the current viewed Flight Plan.

Remove Waypoint (present only if there is a Waypoint under the cursor position):
>Place the cursor over existing Waypoint + 'ENTER' + "REMOVE WAYPOINT" + 'ENTER'
If the Waypoint was within the Flight Plan, the revised leg will be drawn on the screen.

Inserting a Waypoint

To edit a flight plan on the moving map, be sure the flight plan is selected as the "Viewed" flight plan. (See Sec. 6.1). To insert a waypoint between two existing waypoints in the viewed flight plan, move the cursor over the leg to be edited:
> 'ENTER' + "ADD FP LEG" + 'ENTER'.
The new waypoint is now inserted into the flight plan.

3.5 MOVING MAP MENU

The Moving Map Menu provides access to the set up functions of the Moving Map display.
Here you can define the items for display, Map Orientation, Auto Zoom, selective display and other settings to customize the EKP-IV for your navigational needs.
From Moving Map press 'MENU' to display the Moving Map Menu. From here use the cursor key to select the item desired and press 'ENTER' to activate. At any time, press 'CLEAR' to back out of the menus and return to the Moving Map.

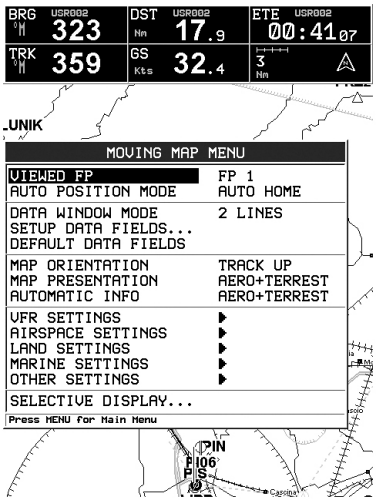


Fig. 3.5 - Moving Map Menu

3.5.1 VIEWED FP

This item enables you to select the Flight Plan to display on the Moving Map from the list of stored Flight Plans. The Flight Plan that is "Viewed" can then be edited or activated from the Moving Map display.

> 'MENU' + "VIEWED FP" + 'ENTER'

The Flight Plan list will display, using the cursor key, highlight the Flight Plan and press 'ENTER'. Select an EMPTY Flight Plan if you do not want a Flight Plan to display on the Moving Map, or to create a new Flight Plan from the Moving Map.

3.5.1.1 AUTO POSITION MODE

To set Auto Zoom or Auto Home mode:

> 'MENU' + "AUTO POSITION MODE" + 'ENTER'

The following options are available:

OFF - The moving map display will remain in 'CURSOR' or 'HOME' mode as set by the user.

AUTO ZOOM - Used to keep the current position and the destination (Target) visible on the map. The map is scrolled and zoomed automatically to keep the best view possible during all phases of flight. When Auto Zoom is selected, and the cursor is active, the map will reposition the cursor to the center point of the current position fix and the destination waypoint as needed to keep both items visible on the display.

AUTO HOME - The Moving Map page will automatically change to the 'HOME' mode when no cursor activity is present for 60 seconds. The default setting is AUTO HOME.

Auto Zoom is On the Auto Zoom mode is activated (see Par. 3.1.3).

> 'MENU' + "AUTO ZOOM" + "ON"+ 'ENTER'

The Auto Zoom mode is used to keep the fix position and the destination (Target) visible on the map. The map is scrolled and zoomed automatically to keep the best view possible.

3.5.2 DATA WINDOW MODE

The Data Window is displayed on the top of the Moving Map. This window provides navigation information relating to the Flight Plan and GPS data. This screen can be customized to allow you to select the information based on your flying needs.

>'MENU' + "DATA WINDOW MODE" + 'ENTER'

The following options are available for the data window display:

OFF

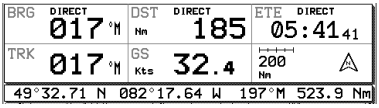
1-line - Provides three fields for data display.

2-lines - Provides six fields for data display.

3-lines - Provides nine fields for data display.

HSI + Fields - Provides the HSI along with 6 data fields in the top half of the display window. (Settings for the HIS display are selected in the HIS menu page, see Sec.5.)

DATA WINDOW mode - Fields option



or

DATA WINDOW mode - Dest+Fields option

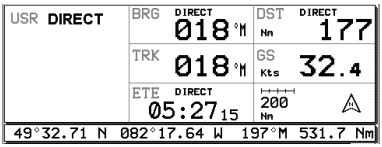


Fig. 3.5.2 - Data Window options

3.5.3 SETUP DATA FIELDS

You can select the item to be displayed in each of the fields of the Data Window. The following figure displays the options available. The fields selected for each window mode option (1-line, 2-lines, etc.) are independent; therefore, you can select different fields for each window view.

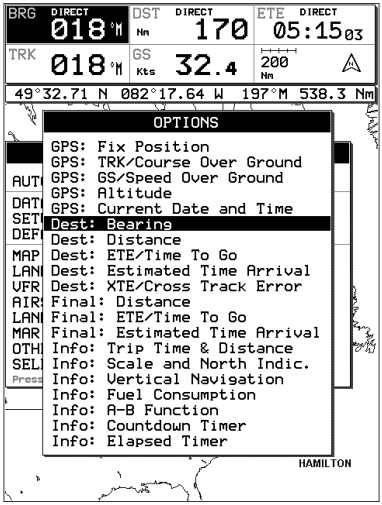


Fig. 3.5.3 - Setup Data Fields

> 'MENU' + "SETUP DATA FIELDS" + 'ENTER'

After pressing 'ENTER', a box in the Data Window will be highlighted. Using the cursor key, select the box to be edited and press 'ENTER'.

The OPTIONS box will appear (see previous figure) allowing you to select the item to display in the highlighted is box. Highlight the desired item from the list and press 'ENTER' to accept. You can then scroll to another box and proceed as above. Once all boxes are set up, press **'CLEAR'** to exit.

NOTE

The Dest: Wpt Info option requires 3 vertical fields for display; therefore, you can only select this option in a top field on the 3-line display or the top field in the HIS + Fields display. If you attempt to select this item in another filed, the system will beep three times and revert to the previous selection mode.

If you have the Dest: Wpt Info displayed and would like to change to three different items, select the top of the Destination Info box. The first filed will display the one you selected and the bottom two fields will display default items.

3.5.4 DEFAULT DATAFIELDS

This will restore data fields settings to default values

> 'MENU' + "DEFAULT DATA FIELDS" + 'ENTER'

The message "DONE" will appear to the right confirming the action is complete. The Default Fields will only be applied to the currently selected Data Window Option; i.e. 1-Line, 2-Lines, etc. .

3.5.5 MAP ORIENTATION

Map Orientation controls the direction that the Moving Map is pointing during Home and Auto Zoom modes.

> **'MENU' + "MAP ORIENTATION" + 'ENTER'**

The options are:

Track-up - will rotate the map automatically to keep your Track pointed toward the top of the display (see Par. 14.2.6; System Setup + Fix Setup + Head Up Response).

Course-up - will rotate the map automatically to keep your active leg pointed toward the top of the display.

North-up - will rotate the map automatically to keep North pointing toward the top of the display.

During North - up mode the Screen Amplifier is active. Depending on the Heading, the fix icon is placed on one of the 8 positions. For example, if the Heading is 45°, the fix icon is placed on the bottom left part of the screen (see Fig. 3.5.5). This method of icon placement allows for the maximum view ahead of the aircraft at the given direction of travel.

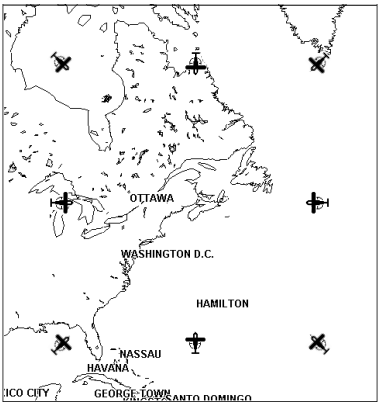


Fig. 3.5.5 - 8 marks at the areas where the icon may appear

3.5.6 MAP PRESENTATION SETTINGS

Map Presentation allows you to select the priority of the map display and color selections among AERO+TERRESTRIAL/AERONAUTICAL/MARINE settings.

> **'MENU' + "MAP PRESENTATION" + 'ENTER'**

The options are: Aero + Terrest, Aeronautical, Marine. The default setting is Aero + Terrest. Aeronautical setting will change all land based detail to a light color to enhance the aeronautical data. When using aviation and land based Compact Flashs, be sure this setting is on Aero + Terrestrial. Switch to Marine when utilizing the C-MAP Marine Compact Flashs.

3.5.7 AUTOMATIC INFORMATION

The display of Automatic Information is controlled by this setting. The cat-

egory of detail selected will be displayed on the Moving Map automatically when the cursor is placed over the object.

> 'MENU' + "AUTOMATIC INFO" + 'ENTER'

The selection options are: OFF/AERO+TERREST /AERONAUTICAL/ TERRESTRIAL/MARINE (refer to Par. 3.3). If the category is turned Off, no details about objects will be displayed automatically. (Full Info is can be viewed from the Cursor Menu.) The default setting is Aero + Terrest.

3.5.8 VFR, AIRSPACE, LAND, MARINE AND OTHER SETTINGS

The following menus enable/disable the display of categories of data.

> 'MENU' + "VFR/AIRSPACE/LAND/MARINE/OTHER SETTINGS" + 'ENTER'

3.5.8.1 VFR Settings

The VFR Settings category relates to the aviation features found in the Navdata Compact Flash.

Airports: ON/OFF. The default setting is On.
VOR: ON/OFF. The default setting is On.
NDB: ON/OFF. The default setting is On.
Intersections: ON/OFF. The default setting is On.
Vertical Obstructions: ON/OFF. The default setting is On.
Aero Objects Id: OFF/SMALL/MEDIUM/LARGE. The default setting is Large.
Enroute Communications: ON/OFF. The default setting is On.

3.5.8.2 Airspace Settings

The Airspace Settings category relates to the airspace data found in the Navdata Compact Flash.

Controlled Areas: ON/OFF. The default setting is On.
Restricted Areas: ON/OFF. The default setting is On.
FIR and UIR: ON/OFF. The default setting is Off.
MORA: ON/OFF. The default setting is Off.

3.5.8.3 Land Settings

The Land Settings menu controls the level of cartographic detail shown.

Roads: ON/OFF. The default setting is On.
Road Labels: OFF/AMERICAN/EUROPEAN. The default setting is American.
Railroads: ON/OFF. The default setting is On.
City Names: ON/OFF. The default setting is On.
Rivers & Lakes: ON/OFF. The default setting is On.
Cultural Features: ON/OFF. The default setting is On.
Natural Features: ON/OFF. The default setting is On.
Landmarks: ON/OFF. The default setting is Off.

3.5.8.4 Marine Settings
The Marine Settings menu controls the detail shown from a C-MAP Marine Compact Flash.
Lights: ON/OFF/NO SECTOR. When Lights are On lights are shown on lighthouses and other lights that rotate, a light sector is displayed to show the range of coverage for the light. In the No Sector setting the light is shown without sector. The default setting is On.
Chart Boundaries: ON/OFF/AUTO. The default setting is On.
Bathymetric & Soundings: ON/OFF. The default setting is On.
Bathymetric & SND Range: Sets the min/max value for Bathymetrics and Soundings. If the depth unit is Meter (MT), the range is [0 - 15000], if Feet (FT) is [0 - 49212], if Fathom (FM) is [0 - 8202]. The default setting is [0, 33] FT.
Depth Area Limit: Sets a reference depth value (in the range [0 - 30000]). The Depth Areas shown on the screen are filled with three different shades of blue. Selecting the Min and Max values in the range of Depth Limit, there are three areas: [0, Min] colored with dark blue, [Min, Max] colored in blue and [Max, 15000] colored in light blue. The default setting is 6 Ft for Depth Areas Limit 1 and 50 Ft for Depth Areas Limit 2.
Navigational Aids: ON/OFF. The default setting is On.
Attention Areas: ON/OFF/CONTOUR. The default setting is Contour.
Tracks & Routes: ON/OFF. The default setting is On.

3.5.8.5 Other Settings
User Points: OFF/ICON/ICON LABEL. The default setting is Icon/Label.
Objects Overlap: ON/OFF. The default setting is On. When more then one object is at the same position, the selection of On allows the screen to draw the objects overlapping.
LAT/LON Grid: ON/OFF. The default setting is Off.

3.5.9 SELECTIVE DISPLAY SETTINGS
In addition to the above Moving Map Settings the Selective Display feature allows you to further customize the display by selecting the chart scale level at which the category of data will begin displaying on the map. This feature is extremely useful in decluttering the screen in populated areas or at times when you want to focus on a single category of data, i.e. medium airports only.
> 'MENU' + "SELECTIVE DISPLAY..." + 'ENTER'
Scroll through the cells using the cursor key. To select the desired scale you would like the map to begin displaying data for the category, place the cursor within the cell and press 'ENTER'. (The map scale for the cell is displayed at the top right.) Any box with an "X" indicates the feature is not available at that chart scale.
All data for that category will begin to display at that chart scale checked and all scales below.

It is also possible tochoose the catrografic information to be shown based on the selected "Cycle" program.
There are 3 programs available thatthe user can personalize through the 1/2/3 Cycle columns. For each of them it is possible to activate/deactivate any cartographic object.
To change the program from the map pages it is necessary to press 'CYCLE'.

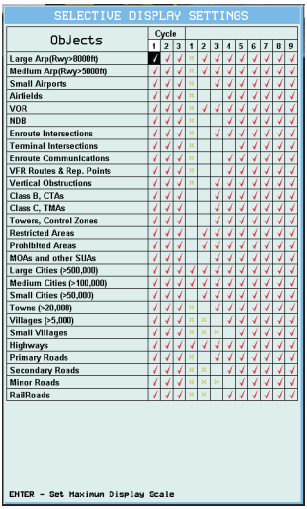


Fig. 3.5.9 - Selective Display Settings

4 Navigation & Location

The Navigation and Location screen displays a full page of navigation information with location coordinates. To access from the Main Menu:

> 'MENU' 1 sec. + "NAV/LOCATION" + 'ENTER'

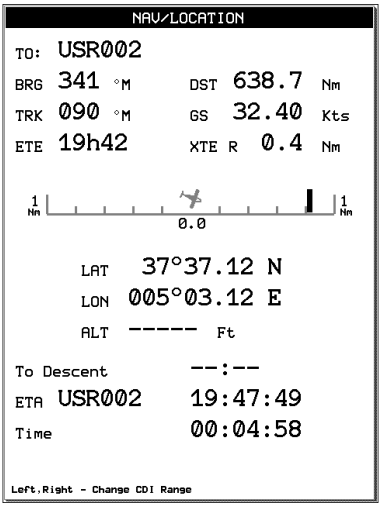


Fig. 4 - Nav/Location screen

4.1 NAVIGATION & LOCATION DATA

The Navigation data displayed in this window is based on the current Flight Plan leg or active Waypoint. If no Flight Plan is active, only Ground Speed and Track can be displayed.
The CDI is a graphic display of Cross Track Error (XTE). The airplane remains at the center, with the course line needle moving right and left in relation to the airplane icon. When the line is to the left of the airplane, you are right off course and must turn left (fly to the line) to close on the course.

NOTE

Distances are measured horizontally.

If the icon rotates 180° and points toward the bottom of the display, you are moving away from the destination.

The numbers on either side of the CDI represent a full-scale deflection.
To change the CDI scale press the left/right cursor key.
The EKP-IV references navigation information to the next Waypoint in the active Flight Plan. When you reach the destination of one leg, the EKP-IV automatically switches to the next leg.
This leg switching occurs when the airplane crosses the bisector of the 2 legs, as shown in the diagram.
The pilot may choose a different leg (forward of the present location) by using the Flight Plan menu and activating the leg destination.

> 'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER'

Highlight the destination Waypoint of the desired leg and press 'GOTO' to activate that leg of the Flight Plan.

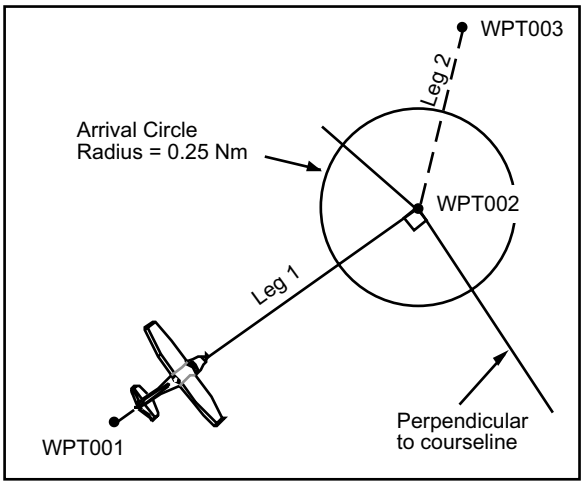


Fig. 4.1 - Flight Plan

The Location information displayed on the Nav/Location screen includes the destination waypoint, Bearing (BRG), Track (TRK), Estimated Time Enroute (ETE), Distance to waypoint (DST), Ground Speed (GS), Cross Track Error (XTE), LAT/LON coordinates, GPS Altitude, Time to Descent, Estimated Time of Arrival (ETA), and the current time.

NOTE

If you are using an external GPS, combinations of time, date and altitude may not be displayed. Normal GPS altitude accuracy can be +/- 1000 feet

The Altitude (ALT), distance and velocity units of measure are selected from Units Setup in the System Setup Menu; the clock format (time and date) is selected from Time Format in Date & Time Setup, also in the Setup Menu (refer to Chapter 14).

4.2 SAVE CURRENT FIX AS USER WAYPOINT

You can save your current position as a User Waypoint while viewing the Nav/Location page by pressing 'ENTER'. A warning box will appear to confirm your desire to add the Waypoint, displaying the default Waypoint name. Press 'ENTER' to accept or 'CLEAR' to cancel.
This Waypoint is now stored in your User Waypoint Database.

5 The HIS Screen

The HSI screen presents the desired course to be flown and the current Track in a graphical format similar to the Horizontal Situation Indicator of an aircraft; using the compass rose as the center of the display. From Moving Map:
> 'MENU' 1 sec. + "HSI SCREEN" + 'ENTER'

5.1 HSI DESCRIPTION

The HSI calculates user data (current Flight Plan and VNAV calculator data) with GPS data to provide the visual display of the parameters of flight. While flying with the HSI mode, the Heading Index and Course Indicator guide you to your destination.

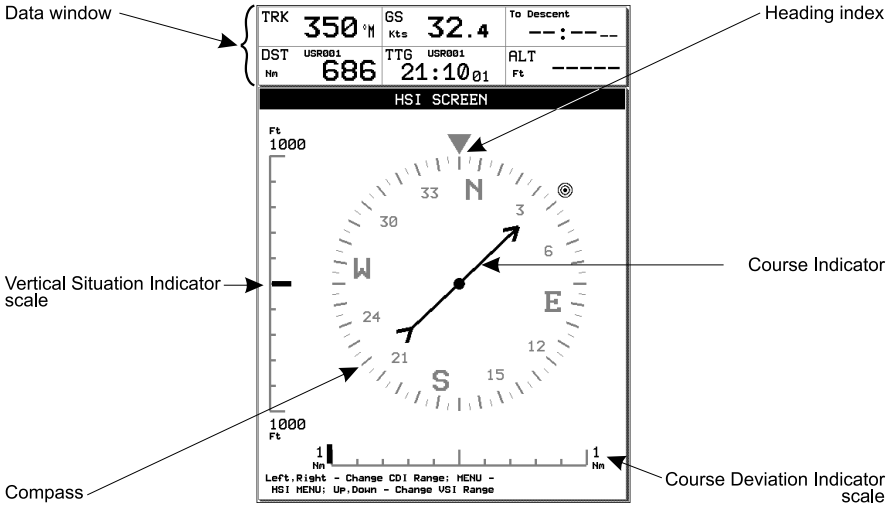


Fig. 5.1 - HSI screen

The Vertical Situation Indicator (VSI) scale is displayed on the left side of the screen, while the Course Deviation Indicator (CDI) scale is displayed at the bottom of the screen. Use the cursor keys up/down to change VSI scale among 250, 500 and 1000 FT. Use the cursor key left/right to change CDI scale among 0.1, 0.5, 1, 2, 5 and 10 NM.
The units of measure are selected from Units Setup in the System Setup Menu, (refer to Chapter 14).

5.2 HSI MENU

When on the HSI screen, pressing 'MENU' will access the HSI Menu with the following options:
Add Mark under Fix, Setup Data Fields, Default Data Fields and Compass Orientation.

5.2.1 ADD MARK UNDER FIX

While in HSI mode, it is possible to create a User Mark under the current position fix. From the HSI screen:
> 'MENU' + "ADD MARK UNDER FIX" + 'ENTER'
An information box will appear confirming the creation of the User Waypoint and informing of the default name applied by the software; press 'ENTER' to accept. To edit this Mark see Par. 8.1.3 and Par. 8.2.2.

5.2.2 SETUP DATAFIELDS

The HSI Data Window can be customized by the user to display navigational data required for his flight; similar to the Moving Map Data Window (see Par. 3.2). You can edit the data fields from the HSI page:
> 'MENU' 1 sec. + "HSI SCREEN" + 'ENTER' + 'MENU' + "SETUP DATA FIELDS..." + 'ENTER'
After pressing 'ENTER' a box in the Data Window will be highlighted. Select the box to be edited and press 'ENTER'. The OPTIONS box will appear allowing you to select the item to display in this box. Once selected, press 'ENTER' to accept.
You can then scroll to another box and proceed as above. Once all boxes are set up, press 'CLEAR' to exit.

5.2.3 DEFAULT DATAFIELDS

This will restore the data field settings to the default values of Track (TRK), Ground Speed (GS), To Descent, Distance (DST), Estimated Time Enroute (ETE) and Altitude (ALT). From the HSI screen:
> 'MENU' + "DEFAULT DATA FIELDS" + 'ENTER'

5.2.4 COMPASS ORIENTATION

The Compass Orientation allows you to set the orientation mode for the HSI compass to either North-up or Track-up. The Compass Orientation controls the rotation such that track heading (Track-up or North-up) always appears at the top of the screen.
> 'MENU' 1 sec + "HSI SCREEN" + 'ENTER' + 'MENU' + "COMPASS ORIENTATION" + 'ENTER'

6 Flight Plan

> 'MENU' 1 sec + "FLIGHT PLAN" + 'ENTER'

The Flight Plan mode allows you to create a Flight Plan with User Points, Temporary Waypoints or Jeppesen object as Waypoints. Flight Plans can be entered on the Moving Map (see Par. 3.5) or in the Flight Plan Menu if all Waypoints are known objects. The EKP-IV can store up to 10 Flight Plans with up to 100 individual legs each. Additional Flight Plans can be stored via the User Compact Flash.

The Flight Plan Menu page provides the BRG, DST, ETA and Fuel data for the active/viewed Flight Plan. By using the left/right cursor key it is possible to change the table columns displayed, choosing between BRG, DST, ETA and DST, ETA, Fuel.

The Flight Plan Menu is where you can edit, view and activate Flight Plans. To open the Flight Plan Menu press 'MENU' from the Flight Plan page.

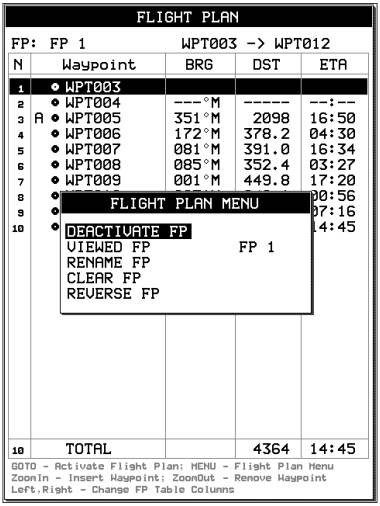


Fig. 6 - Flight Plan page with Flight Plan menu box open

See section 3.4.6 regarding Flight Plan creation from the moving map page.

6.1 VIEWED FLIGHT PLAN

When you enter the Flight Plan Page, the information appearing on the screen

is for the current "Viewed" Flight Plan. The Flight Plan name will appear at the top of the page.
All actions within the Flight Plan menu are related to the currently "Viewed" Flight Plan. To select the Flight Plan to view:

> 'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "VIEWED FP" + 'ENTER'

Using the cursor key, select the Flight Plan desired for viewing/activating/editing.
The "Viewed" Flight Plan will display on the Moving Map. Select an Empty Flight Plan if you do not want a Flight Plan to display on the Moving Map.
In addition, the viewed Flight Plan can be selected from the Moving Map Menu. (See Sec. 3.5.1.)

6.2 CREATING A FLIGHT PLAN FROM THE DATABASE

> 'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU'

The Flight Plan Menu will open. You will need to select Flight Plan number to view. When creating a Flight Plan select an "EMPTY" Flight Plan number:

> 'MENU' + "VIEWED FP" + 'ENTER' + "EMPTY" + 'ENTER' + 'CLEAR'

Press 'ZOOM IN' to begin adding the Waypoints of your Flight Plan.
The "Add Waypoint" box will open allowing you to select the type of object for your first Waypoint. Use the cursor key to select the object type and 'ENTER' to activate. This will bring up the Database Menu for that object. Select the Database item desired (see Par. 8.3.1 in the Database Menu for details on selecting objects) and press 'CLEAR' or 'MENU' to add to the Flight Plan. A warning box will appear asking you to confirm your selection before adding it to the Flight Plan. Press 'ENTER' to accept or 'CLEAR' to quit.
Use the down cursor key to move the highlighted line to the next blank space and proceed as above to continue adding legs to the Flight Plan. As each leg is added, the software will calculate the bearing and distance between legs. The total distance will appear at the bottom of the screen. During flight, the ETA and Fuel data will be calculated based on your actual flight conditions.

6.3 ACTIVATE & DEACTIVATE A FLIGHT PLAN

A Flight Plan must be activated to provide navigational data:

> 'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER'

Be sure the Flight Plan you would like to activate is the "Viewed" Flight Plan appearing on the screen. If it is not, you will need to select it from the Flight Plan menu:

> 'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "VIEWED FP" + 'ENTER' + "FPXX" + 'ENTER' + 'CLEAR'

Activation can be obtained in two ways:

1. The Flight Plan page displays each leg with the first Waypoint highlighted. To activate a leg of the Flight Plan, use the cursor key to select the leg and press 'GOTO'. This will activate navigation to that Waypoint. This method is useful when continuing a Flight Plan after a stop. The letter "A" (Activated) will be shown near the chosen Waypoint.
2. The Flight Plan Menu allows you to Activate/Deactivate the Flight Plan by the following procedure:

> **'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + Select Waypoint + 'MENU' + "ACTIVATE/ DEACTIVATE FP" + 'ENTER' + 'CLEAR'**

NOTE

The first line of the Flight Plan menu will read "Activate"or "Deactivate" dependent upon the current status of the Flight Plan mode.

It is necessary to deactivate a Flight Plan before activating another. Other Flight Plans can be created or edited while another Flight Plan is "Active".
In addtioni, the Flight Plan can be activated/deactivated from the GOTO Menu box.

> **'GOTO' + "ACTIVATE FP" OR "DEACTIVATE FP" + 'ENTER'**

This will activate/deactivate the currently Viewed Flight Plan (See Sec.3.5.1.).

6.4 NAMING A FLIGHT PLAN

The EKP-IV allows you to create a user defined name of 12 alphanumeric characters for each Flight Plan. This name will appear at the top of the page when viewed and in the Flight Plans List when viewing all Flight Plans. To edit the default name:

> **'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "RENAME FP" + 'ENTER'**

Use left/right cursor key to select the field and the up/down cursor key to insert the desired name. At any time in the rename screen, 'ENTER' will activate the name change.

6.5 CLEAR A FLIGHT PLAN

This will delete the Flight Plan from the EKP-IV memory enabling another Flight Plan to be created in this FP number:

> **'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "CLEAR FP" + 'ENTER'**

A Warning window will appear to confirm deletion: press 'ENTER' to confirm, 'CLEAR' to abort.

6.6 REVERSE A FLIGHT PLAN

The Flight Plans stored in the EKP-IV memory can be automatically reversed by:
>'MENU' 1 sec. + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "REVERSE FP" + 'ENTER'
The message "DONE" will appear to the right of the menu selection and the sequence of the Waypoints change immediately on the screen.

6.7 GOTO FLIGHT PLANS

A GoTo Flight Plan is a one leg direct Flight Plan to a specified Database object or cursor position on the Moving Map.

6.7.1 GOTO - DATABASE MODE

To activate a GoTo Flight Plan within a Database page (see Chapter 8) press **'GOTO'**. Doing this will deactivate the current Flight Plan and redraw the screen to the Moving Map page. All navigation information is now related to this object.
To Deactivate the GoTo Flight Plan, from the Moving Map screen press **'GOTO'**. A GoTo Menu box will appear with the option to deactivate. Pressing **"DEACTIVATE FP"** will cancel the navigation data and place the EKP-IV in a Plotter Mode without an active Flight Plan.
If a Flight Plan was active prior to the GOTO, the Flight Plan will resume as active.

6.7.2 GOTO - MOVING MAP MODE

To activate a GoTo Flight Plan from the Moving Map, press 'GOTO'. A "GoTo" Menu box will appear on the screen. You can select the current cursor position or select a Database object category. When selecting the Database category, the Database menu will appear (see Chapter 8 for details on searching the Database Menu). Once the desired object has been found, press 'GOTO' to activate.

NOTE

'GOTO' creates a temporary Flight Plan that is not stored in the EKP-IV memory.

6.8 NEAREST SEARCH FOR GOTO FLIGHT PLAN ACTIVATION

Pressing 'PAGE' at any time will provide a list of the 20 Nearest Database objects. The first page to appear will be the last chosen category of data. To select another category of data, press 'MENU' to display the available categories.

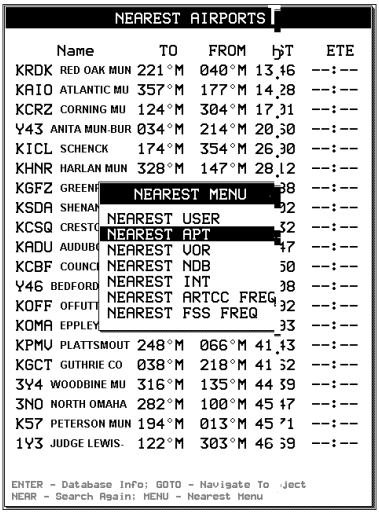

NEAREST AIRPORTS
Name TO FROM DT ETE
KRDK RED OAK MUN 221°M 040°M 13.46 --:--
KAIO ATLANTIC MU 357°M 177°M 14.28 --:--
KCRZ CORNING MU 124°M 304°M 17.31 --:--
Y43 ANITA MUN-BUR 034°M 214°M 20.50 --:--
KICL SCHENCK 174°M 354°M 26.30 --:--
KHNR HARLAN MUN 328°M 147°M 28.12 --:--
KGFZ GREENF 38 --:--
KSDA SHENAN 02 --:--
KCSQ CRESTO 32 --:--
KADU AUDUBO 47 --:--
KCBF COUNCI 50 --:--
Y46 BEDFORD 08 --:--
KOFF OFFUTT 02 --:--
KOMA EPPLEY 33 --:--
KPMV PLATTSMOUT 248°M 066°M 41.43 --:--
KGCT GUTHRIE CO 038°M 218°M 41.52 --:--
3Y4 WOODBINE MU 316°M 135°M 44.59 --:--
3NO NORTH OMAHA 282°M 100°M 45.47 --:--
K57 PETERSON MUN 194°M 013°M 45.71 --:--
1Y3 JUDGE LEWIS. 122°M 303°M 46.59 --:--
NEAREST MENU
NEAREST USER
NEAREST APT
NEAREST VOR
NEAREST NDB
NEAREST INT
NEAREST ARTCC FREQ
NEAREST FSS FREQ
ENTER - Database Info; GOTO - Navigate To ject
NEAR - Search Again; MENU - Nearest Menu

Fig. 6.2 - Nearest function with Nearest menu opened

The Nearest page will display the identifiers, bearing To and From, Distance and Estimated Time Enroute (ETE). Using the cursor key select the desired object and press 'GOTO' to activate a Route to this item.
To obtain additional details regarding the object, press 'ENTER' and the Database page will appear.
To locate the object on the Moving Map without creating a "GoTo" Flight Plan, press and hold 'GOTO' for 2 seconds.

NOTE

The Nearest list displayed is based on your current GPS position. If no GPS position is available, the list is based on the current cursor position.

7 The Global Positioning System

The Global Positioning System (GPS) is a constellation of satellites that orbit the earth twice a day, transmitting precise time and positioning information to anywhere on the globe, 24 hours a day.
The system was designed and deployed by the U.S. Department of Defense to provide continuous, worldwide positioning and navigation data to U.S. and allied military forces. GPS broad commercial applications were recognized early in the system's development, and the U.S. government decided to allow free access to GPS signals. Today, GPS is used in a wide variety of commercial and scientific applications.

7.1 GPS PAGE

The GPS page shows GPS data in graphic mode, displaying satellite availability and status.

> 'MENU' 1 sec. + "GPS PAGE" + 'ENTER'

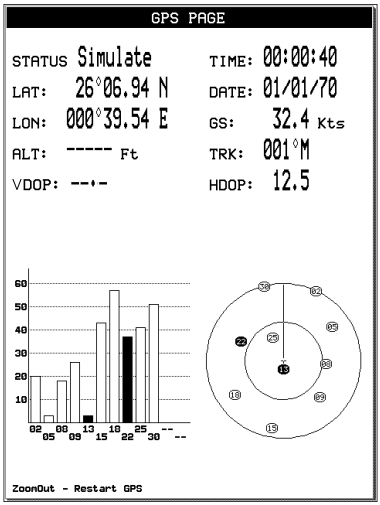


Fig. 7.1 - The GPS page

This page displays the current status and location of all available satellites in the GPS constellation, referenced to the initial position or last fix.
On the bottom half of the screen (see previous figure) there is a polar representa-

tion of the Azimuth and Elevation of the satellites used to compute a position fix. The Elevation is the height of the satellite above the horizon, with 5° (lowest) near the horizon and 90° (highest) being directly overhead (the EKP-IV does not normally use satellites with Elevations lower than 10°). Azimuth is the satellite's location in relation to true north, measured clockwise as a bearing. A satellite with an Azimuth of 90° is to the east.
The circle contains a number indicating the number of the satellite and it is green when it is used for the fix solution (red otherwise). On the left side there are histograms indicating the S/N ratio (SNR). The bar is green when the satellite is used for the fix (red otherwise). When a valid fix is received, the EKP-IV displays the current position coordinates, Date, Time, HDOP, VDOP,GS, TRK and ALT on the GPS page.

7.2 GPS RECEIVER SPECIFICATIONS

- **Receiver** : L1, C/A code, DGPS/WAAS Ready
- **Channels** : 12
- **Max Solution Update Rate**: 10/sec.
- **Cold Start (avg)** : < 45 sec.
- **Warm Start (avg)** : < 40 sec.
- **Hot Start (avg)** : 8 sec.

7.3 HOW GPS WORKS

Each GPS satellite continuously broadcasts two signals: an SPS (Standard Positioning Service) signal for worldwide civilian use and a PPS (Precise Positioning Service) signal for U.S. and Allied military use. The SPS signal is a spread-spectrum signal broadcast at 1575.42 MHz. The signal is virtually resistant to multipath and nighttime interference and is unaffected by weather and electrical noise. All commercial and consumer GPS receivers are SPS receivers.
The SPS signal contains two types of orbit data: almanac and ephemeris. Almanac data contains the health and approximate location of every satellite in the system. A GPS receiver collects almanac data from any available satellite, then uses it to locate the satellites that should be visible at the receiver's location. Ephemeris data represents the precise orbital parameters of a specific satellite. Receivers listen to signals from many satellites simultaneously and triangulate a position fix using the interval between the transmission and reception of each satellite signal (a receiver tracks more satellites than are actually needed for a position fix, so that if one satellite becomes unavailable, the receiver knows

exactly where to find the best possible replacement).
Three satellites are required for two-dimension positioning (which determines position only) and four satellites are required for three-dimension positioning (to determine position and elevation).

7.3.1 ACCURACY

In general, an SPS receiver can provide position information with an error of less than 25 Meters and velocity information with an error of less than 5 Meters per second. For applications that require much greater accuracy the effects of SA and environmentally produced errors can be overcome by using a technique called Differential GPS (DGPS), which increases over-all accuracy.

7.3.2 WAAS

The Federal Aviation Administration (FAA), in cooperation with other DOT organizations and DOD, is augmenting the GPS/SPS with a satellite-based Wide Area Augmentation System (WAAS). WAAS will provide a signal-in-space to WAAS compatible receivers to support en route through precision approach navigation. After achieving initial operational capability, WAAS will be incrementally improved to expand the area of coverage, increase the availability of precision approaches, increase signal redundancy and reduce operational restrictions.

7.3.3 DIFFERENTIAL GPS

Differential GPS (DGPS) uses a GPS receiver at a fixed point with a known position of sub-meter accuracy. This is the control unit. The receiver collects data for all visible satellites and computes predicted satellite ranges, which are compared with actual ranges. The difference is the satellite range error, which is converted to correction signals for use by a roving receiver.
It is assumed that this correction will be the same for other GPS receivers that are in the same area and are using the same satellites for positioning. If the correction is communicated to other receivers in the area (usually by a beacon on the same site), the range error can be removed from satellite signals and precise fixes calculated by these receivers.
It should be noted that not all data errors can be corrected in this way. Errors that are caused by receiver noise (which is inherent in any GPS receiver) and multipath problems cannot be eliminated with differential corrections. (Multipath errors occur when the receiver's antenna "sees" the reflections of signals that have bounced off of surrounding objects.)
Using DGPS to eliminate the effects of correctable errors requires that the user's GPS receiver be connected to a compatible differential beacon receiver and be within range of the broadcasting beacon. The differential beacon re-

ceiver accepts and demodulates the broadcast corrections, which are then relayed to the GPS receiver. The GPS receiver applies the corrections to the navigation data it uses to compute a position solution and displays differentially corrected data. Care must be taken to ensure that the DGPS receiver and the GPS receiver are compatible for this procedure to be successful.

7.3.4 MONITORING & CONTROLLING THE GPS

The Global Positioning System is monitored and controlled by the U.S. Air Force, which is responsible for updating and maintaining exact satellite position and signal data accuracy. It is also responsible for performing maintenance on the satellites, which may require the satellite being taken off-line. Since the system is subject to periodic updates and changes, the almanac data broadcast by the satellites is current for a limited time — generally about 14 days.

7.3.5 GPS INFORMATION SOURCES

The needs of the worldwide civil GPS user community are served by the Civil GPS Information Center (GPSIC) in Virginia. The GPSIC is operated and maintained by the U.S. Coast Guard for the U.S. Department of Transportation. Its primary function is to provide information on the Global Positioning System and satellite status and to serve as a point of contact.

The GPSIC has general GPS literature available free upon request. The Center also maintains up-to-date almanac data and Operational Advisory Broadcasts containing current constellation status and planned satellite outages.

There are three ways to quickly obtain current information about the Global Positioning System from the GPSIC:

1. Recorded phone message at (703) 313-5907

2. WebSite: www.navcen.uscg.mil

3. Live information at phone (703) 313-5900

There are several GPS bulletin board services outside the United States, including:

South Africa	+27 (12) 803 8318
Germany	+49 (69) 6333 418 Internet via TELNET: 141.74.240.25 German X.25 Network, Datex-P (from Sprintnet preferred): 45050262720
Norway	+47 32124045 or +47 32118369
United Kingdom	+44 (602) 422111 full access is available only to members of the UK Civil Satnav Group

There are other sources for GPS information, ranging from free, governmentally produced literature to purchased professional literature and seminars. The geography department of your local college or the local office of the National Geodetic Survey may be able to help.

8 Waypoint & Database

The EKP-IV uses three types of Waypoints:
Jeppesen Waypoints are contained in the Compact Flash and include Airport, VOR, NDB and Intersection Waypoints. Each of these Waypoints is displayed on the Moving Map by an icon.
These Waypoints can be searched in the Database Menu and identified on the Moving Map with Quick Info or Full Info.
Each of these Waypoints can be used in a Flight Plan, for the Nearest Search or GoTo functions. When used in a Flight Plan, details regarding the Waypoint are displayed in the Destination box during flight (when DEST is chosen for display in the Data Window, see Par. 3.5.2).
Our Jeppesen library is updated every 28 days. Please contact your local C-MAP office for update orders and pricing.

User-Defined Waypoints (also called User Waypoints) are created by the user. The user can create unique 8 character names and choose from 16 icons for each waypoint.
Waypoints can be created and edited both on the Moving Map and in the User Waypoint Database page. Like the Jeppesen Waypoints, they can be used in a Flight Plan, for the Nearest Search or GoTo functions.
The EKP-IV can store up to 1,000 User-Defined Waypoints within the internal memory.
The internal waypoint memory capacity is shared with Flight Plan waypoints; i.e. if you have 10 flight plans with 10 waypoints stored in the unit memory, there is room for 900 User Waypoints.

Temporary Waypoints are created only on the Moving Map and are associated with a particular Flight Plan. They are named in the format WPT001, WPT002 etc. Temporary Waypoints can be used at the beginning, middle or end of Flight Plans. They can be used as the destination of a Direct-To Flight Plan, but cannot be accessed in the Nearest function.

8.1 USER WAYPOINTS – MOVING MAP

8.1.1 CREATING USER WAYPOINTS – MOVING MAP

From the Moving Map the User Waypoint is a saved cursor position. To create

a User Waypoint at the cursor position:
> 'ENTER' + "ADD WAYPOINT" + 'ENTER'
A name is automatically assigned in the format "USRxxx", where "xxx" is a sequential number. You may use the default display name, LAT/LON and symbol or edit them.

NOTE

When editing the waypoint, select the "picture" icon to associate the waypoint with the Waypoint Alarm (See Sec 14.3.3).

8.1.2 SAVING PRESENT POSITION – MOVING MAP METHODS

To automatically save your present GPS position as a User Waypoint:
> 'ENTER' 1 sec.
A name is automatically assigned in the format "USRxxx", where "xxx" is a sequential number. The default icon is an X. You may use the default display name, LAT/LON and symbol or edit them.

8.1.3 EDITING USER WAYPOINTS – MOVING MAP METHODS

You can edit the User Waypoint information from the default. From the Moving Map screen:
> Place the cursor over the Waypoint + 'ENTER' + "EDIT WAYPOINT" + 'ENTER'
To edit Name field (up to 8 characters): press left/right cursor key to select the character to be changed and then up/down cursor key to scroll to the desired character. Press 'ENTER' to accept and to pass to the next field.
Repeat the same procedure to change the Coordinates and Icons fields.

8.1.4 DELETING USER WAYPOINTS – MOVING MAP METHODS

A Waypoint can be deleted **only if** it is not being used in a Flight Plan. To delete the User Waypoint from the Moving Map screen:
> Place the cursor over the Waypoint + 'ENTER' + "REMOVE WAYPOINT" + 'ENTER'

NOTE

*Only User Waypoints may be deleted and only if they are **not** contained in a Flight Plan. If the option to Edit or Remove Waypoint is not displayed in the Cursor/Position Menu, adjust the cursor closer to the object icon.*

8.2 USER WAYPOINTS – DATABASE METHODS

8.2.1 CREATING USER WAYPOINTS – DATABASE METHODS

A User Waypoint can be entered manually into the User Database Menu by selecting a display icon, entering a name (up to 8 characters) and keying in the

desired Coordinates. To enter a Waypoint via the Database Menu page from the Moving Map:

> 'MENU' 1 sec. + "DATABASE" + 'ENTER' + "USER WAYPOINTS" + 'ENTER' + 'ZOOM IN'

Edit the name (up to 8 characters) using the left/right cursor key to select the character to be changed and then up/down cursor key to scroll to the desired character. Press 'ENTER' to accept and to pass to the next field. Repeat the same procedure to change the Coordinates and Icons fields.

8.2.2 EDITING USER WAYPOINTS – DATABASE METHODS

To edit a Waypoint already created within the Database from the Moving Map:

> 'MENU' 1 sec. + "DATABASE" + 'ENTER' + "USER WAYPOINTS" +'ENTER' + select

Waypoint to edit + 'ENTER' Using the up/down and left/right keys, select a user icon and press 'ENTER' to move to the next column. Continue in this manner through each column. When you have reached the last column and press 'ENTER' the Waypoint will be saved and sorted into the table alphanumerically.

8.2.3 DELETING USER WAYPOINTS – DATABASE METHODS

A Waypoint can be deleted **only if** it is not being used in a Flight Plan. To delete a Waypoint via the Database Menu from the Moving Map screen:

> 'MENU' 1 sec. + "DATABASE" + 'ENTER' + "USER WAYPOINTS" + 'ENTER' + 'ZOOM OUT'

A warning box will appear asking you to confirm deletion of the Waypoint. Press 'ENTER' to confirm or 'CLEAR' to cancel.

8.3 DATABASE

The Database functions allow the user to search for and display information stored in the data cartridges on Airports, VOR, NDB, Intersections and User Waypoints.

8.3.1 DATABASE MENU

To access the main Database menu from the Moving Map:

> 'MENU' 1 sec + "DATABASE" + 'ENTER'

Options are: Airports, VOR, NDB, Intersections, User Waypoints.
A window shows the different categories of Database items within the EKP-IV. Highlight the category to be searched and press 'ENTER'.
Depending upon the category of object, the Database can be searched by one of three methods: identifier, name or city (and in the Pro version; Places, Streets).

8.3.1.1 Selecting Database Search Fields

Upon entering the Database page for the selected item, (except User Waypoints) the EKP-IV will default the ID box for search criteria by placing a box around the field name. If you would like to search by another field, press the up/down cursor key to select the field and press 'ENTER' to activate the chosen field. At that time a double sided cursor key will appear in the first character field. The double sided cursor key allows you to scroll through the database alpha-numerically.

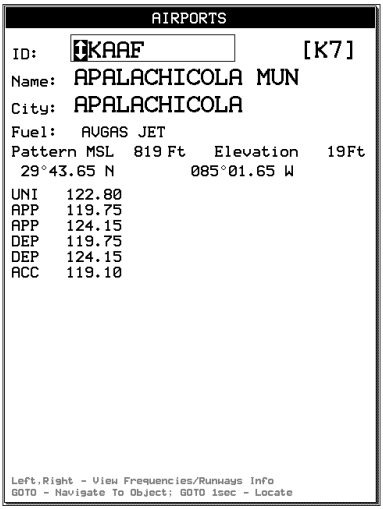


Fig. 8.3.1.1 - Airport Database page with the arrow active on the ID

Or use the left/right cursor key to select the character to be changed and then the up/down cursor key to scroll to the desired character. Press 'ENTER' or 'CLEAR' to obtain the full information for the item displayed.
From the Database page, pressing GOTO will begin a direct flight to the waypoint.
Pressing GOTO for and holding will redraw the moving map centered on the object.

8.3.1.2 Displaying Sunrise and Sunset Information

With the Airport selected on the Database page, press 'PAGE' to display the Sun/Moon information for the airport. If a GPS fix is present, the information will automatically display. If no GPS fix is present, or you would like to see the information for another day, press 'ENTER' to activate the SUN/MOON INFO box and select the date.

NOTE

SEARCHING THE AIRPORT DATABASE *When searching by city for airports located*

within the same city, the double sided cursor key will scroll through each airport within the city. When displaying Airport data, press the left/right cursor key for additional details on the airport frequencies and runway data. Remember to key in the ICAO prefix ("K" for the United States) at the beginning of airport identifiers, where applicable (see Appendix 4 for details).

9 Approach Data Procedures

WARNING: The EKP-IV is not certified for use as the only navigation device during Instrument Flight Rules as established by the FAA. Instrument approach points displayed in the unit are for information only and do not establish authority for a pilot to fly the IFR approach procedure in actual instrument flying conditions. For IFR flight. The final "Approach Segment & Missed Approach Point" the EKP-IV is to be used strictly as a monitoring instrument only.

An approach procedure is a series of pre-determined maneuvres for the orderly transfer of an aircraft, under instrument flight conditions, from the beginning of the initial approach to a point from which a safe landing may be made visually. Generally, the approach pattern and procedure is not chosen until arrival in close proximity of the destination airport, since conditions may change on route. To activate an "Approach" it is necessary to have an active "Flight Plan" or "GOTO".
For each airport with at least one published final approach, there exists one or more named approach procedures. Each approach procedure can be related to a runway and to nearby NavAids (such as ILS, VOR, NDB, GPS...).

9.1 APPROACH FROM THE MOVING MAP

NOTE

You must start with an empty flight plan.

While navigating or planning in the moving map screen, the pilot will not be able to establish an approach on a flight plan, without changing into the Flight Plan mode, but can place the cursor over the selected airport. To display the quick data box press:

> 'ENTER' 1 sec + 'ENTER' (for detailed information).

The detailed information on the airport will be displayed, beginning with the general information and frequencies. By pressing the cursor key on the left, the approaches for the chosen airport will display in the box and the bearing for the viewed approach will display on the moving map. By continuing to press the cursor key on the left the other approaches for the airport will display, the last bearing for the last approach viewed will become white on the moving map and the bearing for the viewed approach will be displayed in black on the moving map.

NOTE

The white approach bearings will disappear once the screen redraws itself.

9.2 APPROACH FROM FLIGHT PLAN DATABASE

Refer to Chapter 6 for Flight Planning.
Flight Plan mode allows the pilot to plan and activate up to ten flight plans with up to 100 individual legs each. Now the EKP-IV allows the pilot to pre-program an approach at the destination end of the flight plan and to change the approach as desired.
Once an airport is present as a final waypoint in the flight plan, press **'MENU'** and **"SELECT APPROACH" + 'ENTER'** and the available approaches for the destination airport will be displayed. Highlight the approach desired, press **'ENTER'** and the waypoints associated for that approach will show in the flight plan list. Press **'CLEAR' + 'CLEAR'** and the flight plan will appear on the moving map.
To change the desired approach for the airport, if one is selected

> **'MENU' + 'MENU' + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "CHANGE APPROACH" - select the approach + 'ENTER'.**

This will substitude the previous approach including the waypoints on the moving map for the new approach and add the new waypoints to your flight plan and the moving map.
To remove desired approach

> **'MENU' + 'MENU' + "FLIGHT PLAN" + 'ENTER' + 'MENU' + "REMOVE APPROACH" + 'ENTER'.**

9.3 SELECT APPROACH FOR GOTO

If a 'GOTO' to an airport is active, pressing **"GOTO"** from the map will display the GOTO menu (regardless of your cursors position).
If an approach to the destination airport is not yet selected (the approach has to be present in the Jeppesen® database), the "GOTO Menu" will display **"Select Approach".**
If an approach is already selected, the "GOTO Menu" will show the options: **"Change Approach"** or **"Remove Approach".**
Selecting **"Select Approach"** or **"Change Approach"** will open a new window with available approaches for the destination airport.
After selecting the desired approach, the EKP-IV will remove the GOTO destination airport and replace it with the approach waypoints.
The 'GOTO' destination is now the first approach waypoint.
The EKP-IVwill take you to the first point of the approach, and after passing through this point automatically, will go to each of the other points of the approach.
Selecting **"Remove Approach"** removes the approach waypoints from the

GOTO destination replacing them with the corresponding airport waypoint (that was originally selected).

Activating a **GOTO with an Approach from database**

If you are in the airports database page

> 'MENU' + 'MENU' + "DATABASE" + "AIRPORTS"

and the screen is displaying approach information, by pressing 'GOTO' you will activate a 'GOTO' to the selected airport and automatically opened the **"Select Approach"** window.

If you don't want to select any approaches just press 'CLEAR'.

10 Calculator

The Calculator functions assist the user in preflight and in-flight calculations for Vertical Navigation, Wind and Fuel consumption. In addition, clock functions and trip data can be found in this menu. The Calculator uses GPS data and user data for computations.
All Calculator functions are based on the active Flight Plan. The active Flight Plan is selected and activated on the Waypoint/Flight Plan menu (see Chapter 6).
> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER'

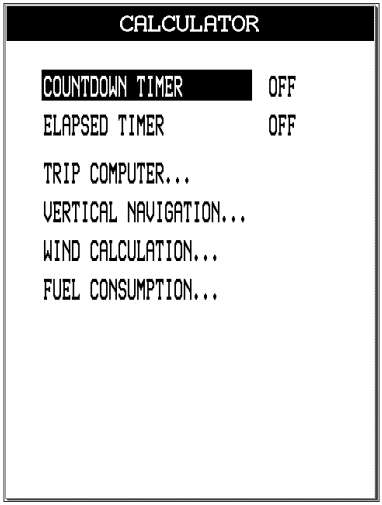


Fig. 10 - Calculator page

10.1 COUNTDOWN TIMER

The Countdown Timer will sound an alarm at the end of the set time interval. The time calculations continue in the background of the software, even if you are not on the Calculator page or do not display the timer data in the data fields window.
The system does require a GPS fix to begin the timer, as the calculation of time is based on the GPS data. If the GPS fix is lost during this mode, the timer will display dashes in the right hand column. The time calculation will continue to work in the background.
> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER' + "COUNTDOWN TIMER" + 'ENTER'

A box will appear in the right hand column allowing you to set the hours, minutes and seconds. Using the cursor key select the number desired and press 'ENTER' to accept and begin the countdown. Entering 00:00:00 equals Off. The default setting is Off (00:00:00).

10.2 ELAPSED TIMER

The Elapsed Timer will begin calculating time from zero when activated. The elapsed time will continue to calculate in the background of the software, even if you are not on the Calculator screen or do not display the timer data in the data fields window.
The system does require a GPS fix to begin the timer, as the calculation of time is based on the GPS data. If the GPS fix is lost during this mode, the timer will display dashes in the right hand column. The time calculation will continue to work in the background.

> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER' + "ELAPSED TIMER" + 'ENTER'

This will begin the timer. To turn Off the timer, press 'ENTER' from this menu. A warning box will appear on screen to confirm your action. Press 'ENTER' to confirm or 'CLEAR' to quit and continue the timer calculation. The default setting is Off (00:00:00).

10.3 TRIP COMPUTER

The EKP-IV provides a calculation page which tracks speed, flying time, and distance traveled.
This data is statistical in nature and is calculated based on GPS parameters.

NOTE

The Fuel Calculator "Starting Fuel" entry will reset the partial trip data.

To select the Trip Computer page:

> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER' + "TRIP COMPUTER" + 'ENTER'

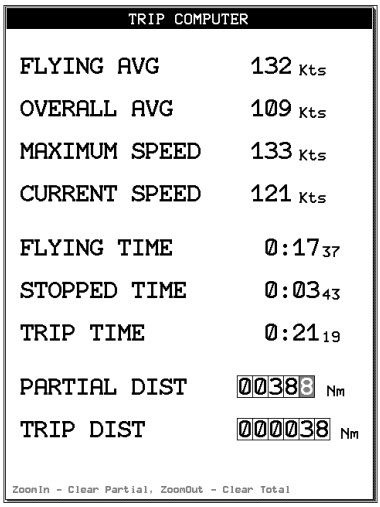

TRIP COMPUTER
FLYING AVG 132 Kts
OVERALL AVG 109 Kts
MAXIMUM SPEED 133 Kts
CURRENT SPEED 121 Kts
FLYING TIME 0:17 37
STOPPED TIME 0:03 43
TRIP TIME 0:21 19
PARTIAL DIST 0038 Nm
TRIP DIST 00038 Nm
ZoomIn - Clear Partial, ZoomOut - Clear Total

Fig. 10.3 - Trip Computer page

Flying Avg: Speed values above 35 knots divided by flying time.
Overall Avg: Speed values divided by Partial Distance.
Maximum Speed: Fastest speed reached
Current Speed: Current GPS speed.
Flying Time: Total time when speed is greater than 35 knots.
Stopped Time: Total time unit was on with a GPS fix and speed was less than 2 knots.
Trip Time: Total time the unit is on regardless of GPS fix.
Partial Dist: Total distance since reset.
Trip Dist: Total distance traveled since reset.
To Reset Partial totals to zero (all fields except trip distance):
While on the Trip Computer Page, press 'ZOOM IN' + 'ENTER' to confirm action.
To Clear all totals (all fields):
While on the Trip Computer Page, press 'ZOOM OUT' + 'ENTER' to confirm action.

10.4 VERTICAL NAVIGATION

The Vertical Navigation (VNAV) function prepares a descent profile and recommends a descent to the altitude of the destination of the active Flight Plan or to some OFFSET point from the destination. The Vertical Situation Indicator in the HSI display is activated with this function (the units of measure used

for the values entered here are selected from Units Setup menu in the System Setup Menu, see Par. 14.5). This feature requires that a Flight Plan be activated.

> 'MENU' 1 sec.+ "CALCULATOR" + 'ENTER' + "VERTICAL NAVIGATION" + 'ENTER'

User data is entered in the fields at the bottom half of the screen. To set Vertical Navigation parameters use 'ENTER' to edit the selected field (a box appears around the active field) and the cursor key to move between fields. Press 'CLEAR' to return to Calculator menu.

NOTE

The Vertical Navigation solution estimates the target altitude (altimeter reading) from glideslope, distance to the Waypoint, and the total altitude change. GPS altitude is not accurate enough for stand alone vertical navigation.

Some values are automatically displayed. Time To Go, Distance, Descent Rate and Altitude From are based on current GPS data. An Altitude To is displayed if a Traffic Pattern Altitude for the destination exists in the Database. Altitude From, Altitude To, Offset Distance and Glide Slope can be edited.
Vertical Navigation is a full screen page with the following structure:

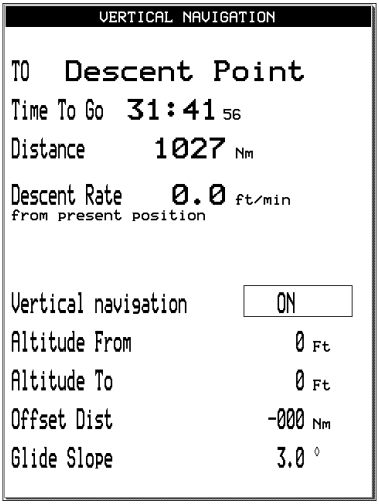


Fig. 10.4 - Vertical Navigation page

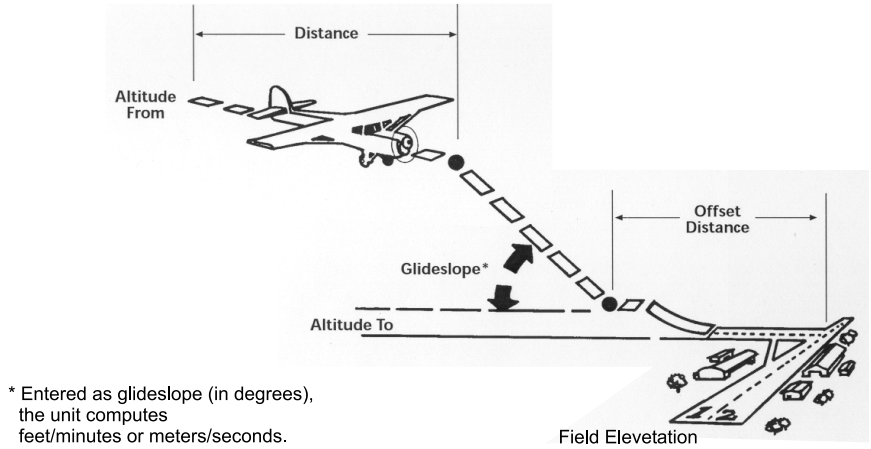


Fig. 10.4a - Vertical Navigation function

Vertical Navigation can be activated (On) only if a Flight Plan is active (destination present).
Destination point for Vertical Navigation is the last point of the Route or destination of GoTo mode.
Prior to the Descent Point being reached the Distance To Go displays TO, Time To Go to Descent point and Descent Rate from the current position.
After passing Descent point the system displays TO, Time To Go to the Destination and Target altitude based on actual descent profile. Time To Descent or Target ALT values can be displayed in the Data Window of Moving Map and HSI modes.
The Vertical Navigation value displayed in the HSI is calculated as a difference between current altitude (from GPS) and Target altitude.

10.5 WIND CALCULATION

The Wind Calculation feature computes winds aloft by comparing Ground Speed and Track with indicated heading, indicated air speed and Outside Air Temperature.

> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER' + "WIND CALCULATION" + 'ENTER'

User data is entered in the fields at the bottom half of the screen. To set Wind Calculation parameters use 'ENTER' to edit the selected field (a box appears around the active field) and the cursor key to move between fields. Press 'CLEAR' to return to Calculator menu.

NOTE

This function works best when the airplane is straight and level.

Wind Calculation is a full screen page with the following structure:

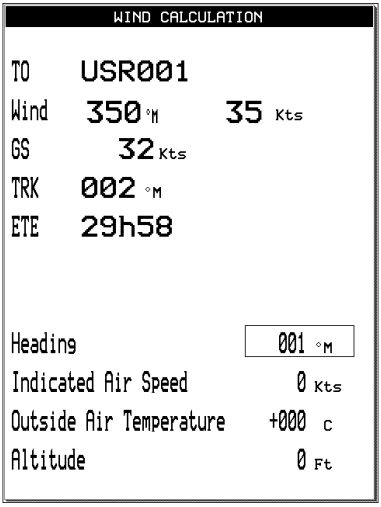


Fig. 10.5 - Wind Calculation page

The EKP-IV computes wind velocity and direction from the information entered above and from the current Ground Speed,Track and Altitude, which are derived from GPS data. ETE to Waypoint is also based on GPS Ground Speed and Track.
Wind information will be recomputed when the heading, air speed, air temperature or Altitude values are edited.

NOTE

The wind calculator does not correct for local barometric pressure, which may not be known accurately enroute. The values produced by the wind calculator may therefore differ from the true winds by up to 5%.

10.6 FUEL CONSUMPTION

The EKP-IV computes Fuel Consumption for each leg of the active Flight Plan or the fuel used in flight, based on entries made by the pilot. This is a useful feature for flight planning purposes. Actual Fuel Consumption will vary based on flight conditions and engine settings.
Fuel can be calculated in pounds, liters or gallons; the units of measure used for the valuesentered here are selected from Units Setup menu in the System Setup Menu (see Par. 14.5).

> 'MENU' 1 sec. + "CALCULATOR" + 'ENTER' + "FUEL CONSUMPTION" + 'ENTER'

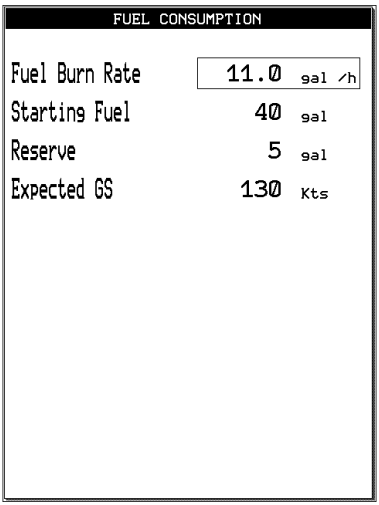


Fig. 10.6 - Fuel Consumption page

To set Fuel Consumption parameters use **'ENTER'** to edit the selected field (a box appears around the active field) and use the cursor key to move between fields. Press 'CLEAR' to return to the Calculator Menu.
If your current Ground Speed is over 20 Knots, the EKP-IV will display "Actual GS" and will not allow you to edit the value.
The EKP-IV will compute and display Fuel Consumption for each leg of a Flight Plan, and total fuel needed for the flight in the Flight Plan page (see Chapter 6). When selected for display, the data fields window will provide information on the flight time remaining before the reserve fuel has been reached.

NOTE

The Fuel Consumption represents calculated fuel use based on user data. The reserve does not represent actual fuel available in the aircraft.

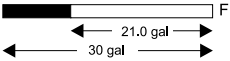
Fuel Consumption can be modified en route by increasing or decreasing the fuel burn rate to match actual usage. The new fuel computation will be averaged over the full distance and provide a good estimate of fuel remaining.
When refueling en route, combine the amount of new fuel and the remaining fuel to enter the new "Starting Fuel" total for true computation of To Reserve data.

NOTE

Fuel calculations are only as accurate as the entries made. Always double-check fuel calculations.

Sample Calculation:
Available fuel = 30 gal
Fuel burn = 13.5 gal/hour
Flight plan distance = 106 Nm
Reserve = 45 minutes

Total fuel est. = 52 min x 13 gal/hour = 11 gal
Total fuel est. With reserves = 1hour38min x 13 gal/hour = 21.0 gal

Fuel gauge = 

$$\frac{\text{Distance}}{\text{Groundspeed}} = \frac{106\ \text{Nm}}{120\ \text{Kts}} = 53\ \text{minutes} = 1\text{hour}\ 38\text{min with reserves}$$

Fig. 10.6a - Sample Calculation

11 The Checklists

The EKP-IV provides a checklist of standard procedures for Engine Start, Ground Check, Pre-Take-off, and Landing.

NOTE

Your aircraft may have additional items that require checking for each procedure. Consult your aircraft manual for a complete list.

> 'MENU' 1 sec. + "CHECKLISTS" + 'ENTER'

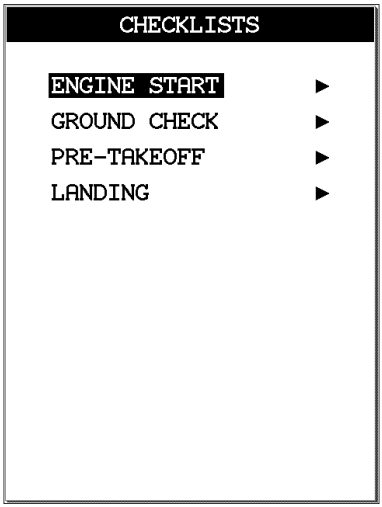


Fig. 11 - Checklists page

11.1 ENGINE START

>'MENU' 1 sec. + "CHECKLISTS" + 'ENTER' + "ENGINE START" + 'ENTER'

After pressing 'ENTER' select each item (Doors/Belts, Parking Brake, CKT BRK, Carb. Heat, Throttle, Mixture, Master Switch, Fuel Pump, Start Engine, RPM/Gauges).

Press 'ENTER' to mark each item after checking is completed. If all the items of the list are not checked upon exit a warning message appears on the screen that states the check-list has not been completed. Press any key to accept.

11.2 GROUND CHECK

> 'MENU' 1 sec. + "CHECKLISTS" + 'ENTER' + "GROUND CHECK" + 'ENTER'
After pressing 'ENTER' select each item (Brakes/Steer, Props/Mags, Vacuum, Oil Tmp/Press, Fuel Pressure, Carb. Heat, Ammeter, Primer-Locked, Flt Controls, Lights).
Press **'ENTER'** to mark each item after checking is completed. If all the items of the list are not checked upon exit a warning message appears on the screen that states the check-list has not been completed. Press any key to accept.

11.3 PRE TAKE-OFF

>'MENU' 1 sec. + "CHECKLISTS" + 'ENTER' + "PRE-TAKEOFF" + 'ENTER'
After pressing 'ENTER' select each item (Instruments, Fuel Tanks, Prop/Mixture, Fuel Pump, Engine Gauges, Carb. Heat-Off, Doors/Belts, Flaps/Trim, Transponder, Radios).
Press **'ENTER'** to mark each item after checking is completed. If all the items of the list are not checked upon exit a warning message appears on the screen that states the check-list has not been completed. Press any key to accept.

11.4 LANDING

>'MENU' 1 sec. + "CHECKLISTS" + 'ENTER' + "LANDING" + 'ENTER'
After pressing 'ENTER' select each item (Mixture, Prop/Mixture, Fuel Tanks, Fuel Pump, Carb. Heat, Seat Belts, Trim, Flaps, Gear, Lights) .
Press **'ENTER'** to mark each item after checking is completed. If all the items of the list are not checked upon exit a warning message appears on the screen that states the check-list has not been completed. Press any key to accept.

12 Simulator

The built-in Simulator function allows you to become proficient in the use of the EKP-IV before ever taking it into the cockpit. No current position fix is required because the EKP-IV simulates position data internally. The EKP-IV simulates flight in two ways: a straight flight path or following a selected route. The Simulator will display various altitudes during simulation mode.
Fix status displayed in the GPS page during this mode is "Simulation".

12.1 SIMULATING STRAIGHT MODE

For Straight Mode of Simulation, you enter the of Speed and Heading. The EKP-IV will then fly that speed and heading indefinitely until a change is made, i.e. you adjust either parameter.
The starting position for the Simulation is the current cursor position.

To start the simulator:
> 'MENU' 1 sec. + "SIMULATOR" + 'ENTER' + "SPEED" + 'ENTER'
Using the cursor key select the desired Speed and press **'ENTER'**.

> "HEADING" + 'ENTER'
Using the cursor key select the desired Heading and press **'ENTER'**.
(Speed and Heading can be adjusted during the simulated flight.)

>"SIMULATION MODE" + 'ENTER' + 'STRAIGHT' + 'ENTER'

Once the settings are selected, turn on the Simulator:
> "SIMULATION" + 'ENTER' + "ON" + 'ENTER'

All functions of the EKP-IV will work as in normal flight except for Altitude related functions.

12.2 SIMULATING ROUTE MODE

To Simulate the flight of an existing Flight Plan, be sure the flight is the "Viewed" Flight Plan (see Par. 6.1) Then enter the Simulator Menu and select the parameters of "Speed" and "Flight Plan Mode".

>'MENU' 1 sec. + "SIMULATOR" + 'ENTER' + "SPEED" + 'ENTER'
Using the cursor key select the desired Speed and press 'ENTER'.
Speed can be adjusted during the simulated flight.

>"SIMULATION MODE" + 'ENTER' + 'ROUTE' + 'ENTER'

Once the settings are selected, turn on the Simulator:
>"SIMULATION" + 'ENTER' + "ON" + 'ENTER'

The simulated aircraft position will now fly the active Flight Plan from the first Waypoint. All functions of the EKP-IV will work as in normal flight except for Altitude related functions.

NOTE

As stated earlier, in the Simulation mode the EKP-IV retains full functionality. It is recommended that the Simulator be used to experiment with the full range of capabilities contained within the EKP-IV so that you may get the most out of it when used in the cockpit.

12.3 TURNING THE SIMULATOR OFF

The Simulator may be turned Off and the EKP-IV returned to normal operation as follows:
>'MENU' 1 sec. + "SIMULATOR" + 'ENTER' + "SIMULATION" + 'ENTER' + "OFF" + 'ENTER'
If the EKP-IV had a position fix before the Simulation mode was entered, then normal operation will resume. If there was no position fix, the EKP-IV begins a satellite search and should obtain a position fix in the same manner as normal start-up.

13 The Communication

The Communications Menu contains options that control the GPS data input:
>'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER'

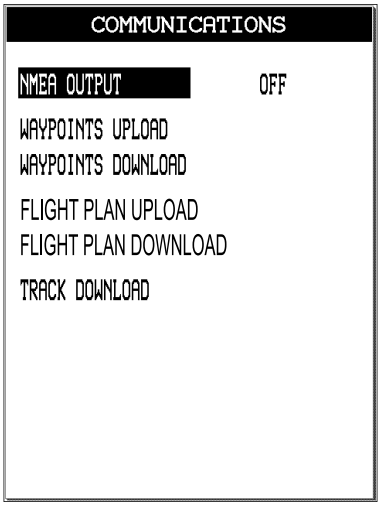


Fig. 13 - Communications Menu

13.1 NMEA OUTPUT

The EKP-IV can be attached to external equipment that accepts GPS data input (see Chapter 15 for wiring). Once attached, the output of NMEA formatted data can be enabled in the following manner:
> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "NMEA OUTPUT" + 'ENTER' + "ON"
The default setting is Off. (See Appendix F for details on NMEA data formatting.)

13.2 WAYPOINTS UPLOAD/DOWNLOADS

The Upload Waypoint function allows the unit to receive a Waypoint from the serial port using the NMEA0183 $WPL sentence (see Appendix F):
> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "WAYPOINTS UPLOAD" + 'ENTER'
The Download Waypoint function allows the unit to send the current Waypoints to the serial port using the NMEA0183 $WPL sentence (see Appendix F):

>'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "WAYPOINTS DOWNLOAD" + 'ENTER'

13.3 FLIGHT PLAN UPLOAD/DOWNLOAD

The Upload Flight Plan function allows the unit to receive a Flight Plan from the serial port using the NMEA0183 $WPL and $RTE sentences (see Appendix F):
> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "FLIGHT PLAN UPLOAD" + 'ENTER'
The received Flight Plan is saved in the active Flight Plan. If the current Flight Plan contains data the user will be asked to confirm the action (overwriting the existing Flight Plan) or to choose another Flight Plan.
The Download Flight Plan function allows the unit to send the current Flight Plan to the serial port using the NMEA0183 $WPL and $RTE sentences (see Appendix F):
> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "FLIGHT PLAN DOWNLOAD" + 'ENTER'

13.4 TRACK DOWNLOAD

The Download Track function allows the unit to send Track data from the serial port using the C-MAP Proprietary NMEA0183 $PCMPT sentence (see Appendix F):
> 'MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "TRACK DOWNLOAD" + 'ENTER'

14 The System Set-up Menu

The System Setup Menu allows the user to change how the EKP-IV displays information. System Setup options are arranged in sub-menus. For example, all options that relate to the Fix functions are in Fix Setup sub-menu and all options related to time or date are in Date Time Setup.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER'**

Once you are in the System Setup Menu, use the cursor key to highlight the sub-menu desired and press 'ENTER' to activate or to proceed to the next selection.

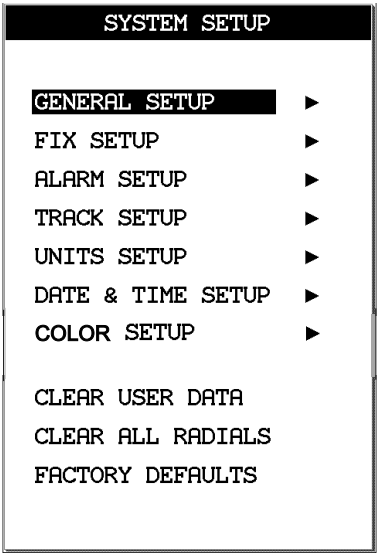


Fig. 14 - The System Setup Menu

14.1 GENERAL SET-UP

The General Setup sub-menu controls the EKP-IV settings.

> **'MENU' 1 sec.+ "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" + 'ENTER'**

14.1.1 Beeper

The EKP-IV makes a beep with each key press, warning or alarm message.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" + 'ENTER' + "BEEPER" + 'ENTER'**

Use the cursor key to select and 'ENTER' to accept. The Off selection of this menu will turn all beeper sounds Off. The default setting is On.

14.1.2 Scale format

Selects the desired setting for display of the map scale in the Data Window field.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" + 'ENTER' + "SCALE FORMAT" + 'ENTER'**

The selection options are:

BAR - the width of the screen is equal to the bar length times the number displayed.

LEVEL - a letter associated with C-MAP's chart cell level is displayed.

WIDTH - the width of the screen is displayed.

Use the cursor key to select and 'ENTER' to accept. The default setting is Bar.

14.1.3 Language

Selects the language in which you wish menu information to be displayed (i.e. screen labels, menus and options). Map detail will remain in English.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" 'ENTER' + "LANGUAGE" + 'ENTER'**

Use the cursor key to select and 'ENTER' to accept. The default setting is English.

14.1.4 Military Frequency

The display of Military Frequency data can be set to ON or OFF (this data is found in

European Database cards).

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "GENERAL SETUP" + 'ENTER' + "MILITARY FREQUENCY" + 'ENTER'**

Use the cursor key to select and 'ENTER' to accept. The default setting is Off.

14.2 FIX SET-UP

The Fix Setup sub-menu contains options relating to GPS data input and display.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER'**

14.2.1 FIX SOURCE

The EKP-IV uses positioning information provided by the internal GPS-receiver or by an external NMEA 0183, external Air Data, or External RNAVdata string.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "FIX SOURCE" + 'ENTER'**

Use the cursor key to select and **'ENTER'** to accept. When connecting the EKP-IV to an external source, be sure the data output of the external device is set for the correct format (see Sec. 2.5). *The default setting is Internal GPS.*

14.2.2 DIFFERENTIAL CORRECTION SOURCE

The EKP-IV can be connected to a DGPS Beacon Receiver that sends RTCM-104 data. To select the Differential Correction source:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "DIFFERENTIAL CORRECTION SOURCE" + 'ENTER'**

Options are: NONE, WAAS, RTCM 1200, RTCM 2400, RTCM 4800, RTCM 9600, RTCM 19200, RTCM 38400. The default setting is NONE. WAAS corrections are handled by the internal GPS receiver and do not require additional equipment.

14.2.3 FIX SYMBOL

A flashing icon on the Moving Map displays the GPS position fix.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "FIX SYMBOL" + 'ENTER'**

This setting allows you to select among a Plane or Standard (circle with an "X") icon. The default setting is Plane.

14.2.4 STATIC NAVIGATION

A GPS-receiver can produce speed settings that are minimal when standing still. The Static Navigation sets a threshold for the speed. When the speed received from the positioning device is under 0.89 knots, the EKP-IV displays zero. The default setting is On.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "STATIC NAVIGATION" + 'ENTER'**

14.2.5 COURSE PREDICTOR

The EKP-IV will display a line with a circle at the end to indicate the position your aircraft will reach at the set time, based on current direction of travel and speed. This is continuously updated to account for changes.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "COURSE PREDICTOR" + 'ENTER'**

Setting options are: OFF, INFINITE, 1 MIN, 3 MIN, 6 MIN, 10 MIN, 30 MIN, 1 HOUR, 2 HOURS. The default setting is 10 MIN.

14.2.6 HEAD UP RESPONSE

The Head Up Response is related to the Track-up mode of operation. When

displaying the position fix in Track-up, the setting selected here will enable the heading to vary +/- the degree selected before the map is redrawn. A higher number here will result in less redraw time.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "HEAD UP RESPONSE" + 'ENTER'**

Setting options are: +/-5, +/-10, +/-15, +/-45, +/-90. The default setting is +/-15.

14.3 ALARM SET-UP

The EKP-IV provides alarm settings for various functions. Here you can set the system for your navigational requirements.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "ALARM SETUP" + 'ENTER'**

14.3.1 ARRIVAL ALARM RADIUS

Specifies the radius of a circle around the Waypoint of a Route: when your aircraft reaches a point within this circle an alarm sounds and the Waypoint Arrival box appears on screen. To set this alarm:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "ALARM SETUP" + 'ENTER' + "ARRIVAL ALARM RADIUS" + 'ENTER'**

After pressing 'ENTER' a box will appear with 00.00. Using the cursor key select the number desired and press 'ENTER'. The default setting is Off (00.00).

14.3.2 XTE ALARM RANGE

Specifies the distance your Cross Track Error (XTE) can vary before the sound of an alarm.

To set this alarm:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "ALARM SETUP" + 'ENTER' + "XTE ALARM RANGE" + 'ENTER'**

After pressing 'ENTER' a box will appear with 00. Using the cursor key select the number desired and press 'ENTER'. The default setting is Off (00).

14.3.3 WAYPOINT ALARM RADIUS

Specifies the radius of a circle around the User Waypoint: when your aircraft reaches a point within this circle an alarm sounds and the Waypoint Alarm box apprears on the screen.

Note: The alarm is only active for User Waypoints with this symbol selected for the icon: "alarm logo".

To set the alarm:

> **'MENU' 1 sec + 'MENU' + "ALARM SETUP" + 'ENTER' + "AIRSPACE AHEAD ALARM" + 'ENTER'**

After pressing 'ENTER' a box will appear with 00.00. Using the cursor key,

select the number desired and press 'ENTER'. The default setting is OFF (00.00).

14.3.4 AIRSPACE AHEAD ALARM

If your projected track will cross an airspace sector, an alarm will sound and a warning box will appear on the screen. If there is an altitude limitation to the airspace, we will display an alarm if your current altitude is within 500 feet of the limitations.
To set the time interval for the alarm:

> **'MENU' 1 sec + "ALARM SERUP: + 'ENTER' "AIRSPACE AHEAD ALARM" + 'ENTER'**

After pressing **'ENTER'** a box will appear with 00.00. Using the cursor key, select the number desired and press **'ENTER'**.
The default setting is OFF (00.00).
In addition, you can select the category of airspace associated with the alarm.
To select the categories:

> **'MENU' 1 sec 'MENU; + "ALARM SETUP"**

Use the cursor key to select each category of airspace and turn ON/OFF the alarm for that category. The time interval set above is for all airspace selected as ON.

14.3.5 EVENT LOG

The Event Log page contains information on Event as Power On, Power Off, GPS Fix Lost, and so on. For each Event, the Event name, Time and Date are shown.
To Select the Event LOG page:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "ALARM SETUP" + 'ENTER' + "EVENT LOG..." + 'ENTER'**

14.3.6 CLEAR EVENT LOG

Clears the Event Log memory and starts new:

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "ALARM SETUP" + 'ENTER' + "CLEAR EVENT LOG" + 'ENTER'**

After pressing 'ENTER' a window appears: press 'ENTER' to confirm deletion (or 'CLEAR' to abort function). The message "DONE" will appear confirming the action.

14.4 TRACK SET-UP

Track is the actual course traveled, which the EKP-IV can display as a series of connected dots.
The interval setting can be defined by the pilot.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "TRACK SETUP" + 'ENTER'**

14.4.1 TRACK DISPLAY

Track display On will display track history on the Moving Map. All track data stored in the unit memory will be displayed. The default setting is Off.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "TRACK SETUP" + 'ENTER' + "TRACK DISPLAY" + 'ENTER'**

14.4.2 TRACK RECORDING STEP

The EKP-IV stores up to 5,000 data points to display a pattern of aircraft movement (Track).

After 5,000 intervals the oldest is deleted with each new position fix point. The following options assist in getting the most track memory for your type of flying.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "TRACK SETUP" + 'ENTER' + "TRACK RECORDING STEP" + 'ENTER'**

Distance - will store a fix point at the specified interval of distance.

Time - will store a fix point at the specified interval of: 5 sec, 30 sec, 1 min.

Auto - this allows for the most efficient use of the memory as the software will determine when to store a fix point based on straight and curved flight paths. The default setting is Auto.

14.4.3 CLEAR TRACK

Deletes all of the Track history and begins new.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "TRACK SETUP" + 'ENTER' + "CLEAR TRACK" + 'ENTER'**

After pressing 'ENTER' a window appears; press 'ENTER' to confirm deletion or 'CLEAR' to abort function. The message "DONE" will appear confirming the action.

14.4.4 REMAINING TRACK

The remaining track memory is displayed on the Track Setup Menu page. The number displayed will be points, time, or distance based on the recording step selection.

14.5 UNITS SET-UP

This sub-menu contains the various options that define how the EKP-IV displays units of measurement.

> **'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER'**

14.5.1 DISTANCE UNIT

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "DISTANCE" + 'ENTER'

Distance measurements can be displayed in Statute Miles (SM), Nautical Miles (NM) or kilometers (KM). The default setting is NM.

14.5.2 SPEED UNITS

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "SPEED" + 'ENTER'

Speed measurements can be displayed in miles per hour (MPH), Knots (KTS) or kilometers per hour (KMH). The default setting is Knots.

14.5.3 ALTITUDE UNIT

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "ALTITUDE" + 'ENTER'

Altitude measurements can be displayed in Feet (FT), Meters (MT) or Flight Levels (FL). The default setting is Feet.

14.5.4 DEPTH UNIT

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "DEPTH" + 'ENTER'

Depth measurements can be displayed in Feet (FT), Fathoms (FM) or Meters (MT). The default setting is Feet.

14.5.5 FUEL UNIT

Fuel units are used in the Fuel Consumption Calculator.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "FUEL" + 'ENTER'

You may select Gallons (GAL), Liters (LIT), Kilograms (KG), Pounds (LB) or British Gallons (BGAL). The default setting is Gallons.

14.5.6 DESCENT RATE

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "DESCENT RATE" + 'ENTER'

The Descent Rate is used in the Vertical Navigation calculation. It can be displayed as Feet per Minute (FT/MIN) or Meters per second (M/S) or Degrees (DEG). The default setting is Feet per Minute.

14.5.7 TEMPERATURE

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "TEMPERATURE" + 'ENTER'

The Temperature is used in the Wind Calculation. You may select Fahrenheit (F) or Celsius (C). The default setting is Celsius.

14.5.8 NORTH REFERENCE

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "NORTH REFERENCE" + 'ENTER'

The North Reference for calculations can be shown as Magnetic or True (Magnetic uses an automatic adjustment for local magnetic variation).
The North Reference used for wind computations and runway information is always Magnetic; all other heading, bearing and Track computations are based on the user-selected reference. The default setting is Magnetic.

14.5.9 COORDINATE SYSTEM

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "UNITS SETUP" + 'ENTER' + "COORDINATE SYSTEM" + 'ENTER'

Sets the display of the Latitude/Longitude coordinates system among: DDD MM SS (Degrees, Minutes, Seconds); DDD MM.mm (Degrees, Minutes - to two decimals); DDD MM.mmm (Degrees, Minutes - to three decimals); UTM, OSGB. The default setting is DDD MM.mm.

14.6 DATE & TIME SET-UP

These functions control how the EKP-IV displays time and date settings.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "DATE & TIME SETUP" + 'ENTER'

14.6.1 TIME FORMAT

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "DATE & TIME SETUP" + 'ENTER' + "TIME FORMAT" + 'ENTER'

Using the cursor key select the desired setting and press 'ENTER'.
Time can be displayed as UTC (Zulu time) 12 hour or 24 hour local time. The default setting is 24/Local.
If you select a local time display, continue with the next step.

14.6.2 LOCAL TIME DIFFERENCE

If you select local time above, you must key in an offset from UTC. The correct time difference must be entered to calculate the local time.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "DATE & TIME SETUP" + 'ENTER' + "LOCAL TIME DIFFERENCE" + 'ENTER'

After pressing 'ENTER' a window appears; using the cursor key, select the difference between local time and UTC to the nearest 30 Minutes. Press 'ENTER' to activate.

NOTE

If you are unsure what the time difference is for your area, get a position fix using the UTC format. Display the Location page and note the displayed time. Compare UTC to your local time and note

the difference. Key in the difference as hours and minutes to the nearest half hour, using a negative value if you are in the western hemisphere (for example, the difference in New York is -5 hours, or -4 hours on Daylight Savings Time).

14.6.3 DATA FORMAT

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "DATE & TIME SETUP" + 'ENTER' + "DATE FORMAT" + 'ENTER'

The EKP-IV displays dates as MM/DD/YY – Month/Day/Year or DD/MM/YY – Day/Month/Year. The default setting is MM/DD/YY.

14.7 COLORS SET-UP

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "COLORS SETUP" + 'ENTER'

14.7.1 DATA WINDOW COLORS

This setting controls the background color of the data window display.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "COLORS SETUP" + 'ENTER' + "DATA WINDOW COLOR"

The options are Dark or Light. The default is Dark.

14.7.2 TRACK COLOR

The color of the track history display line can be selected from this menu setting.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "COLORS SETUP" + 'ENTER' + "DATA WINDOW COLOR"

Using the cursor key select the color and press **'ENTER'** to accept.
The "Track Display" setting in the "Track Setup" menu must be On.

14.8 CLEAR USER DATA

Deletes all Flight Plans, Track history and User Waypoints.

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "CLEAR USER DATA" + 'ENTER'

After pressing 'ENTER' a window appears; press **'ENTER'** to confirm deletion, or **'CLEAR'** to abort function. The message "DONE" will appear confirming the action.

14.9 CLEAR ALL RADIALS

You can delete all stored Projected Radial lines displayed on the Moving Map

with this one function.
> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "CLEAR ALL RADIALS" + 'ENTER'
After pressing 'ENTER' a window appears; press 'ENTER' to confirm deletion, or 'CLEAR' to abort function.
The message "DONE" will appear confirming the action.

14.10 FACTORY DEFAULTS

This will restore the EKP-IV to all factory default settings.
> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FACTORY DEFAULTS" + 'ENTER'
After pressing 'ENTER' a window appears; press 'ENTER' to confirm , or 'CLEAR' to abort function.
The message "DONE" will appear confirming the action.

15 Operating Requirements

The EKP-IV must be connected to a 10–35 V DC power source and the antenna requires a clear view of the sky in order to operate.

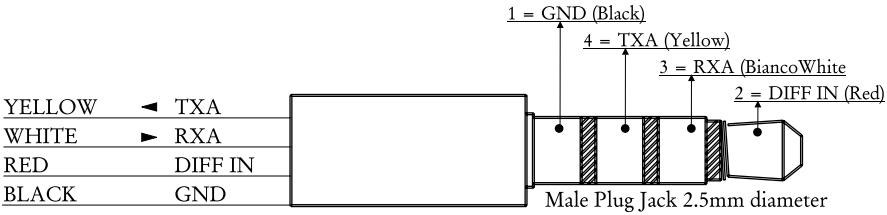


Fig. 15 - Power and I/O Connector

NOTE

The cable that ends with wires is available as an optional part. Please contact your local C-MAP office for details.

15.1 ANTENNA ASSEMBLY & PLACEMENT

The antenna comes with a 5 meter cable with a SMB connector. The antenna is designed for use inside the aircraft. It can be temporarily mounted on the aircraft's dashboard using the included velcro strip.
The antenna must have a clear view of the sky in order to receive satellite signals. GPS uses "line of sight" signals to locate and track satellites. If the signals are obstructed by dense objects such as aluminum, steel or even heavy ice, the EKP-IV will not operate properly. Signals may also be blocked by heated wind screens (fiberglass, plexiglass and other plastics are nor-mally transparent to GPS signals).
The antenna can be mounted to any convenient surface that has a clear view of the sky. If you find that the EKP-IV does not locate and track satellites quickly or consistently, move the antenna. Moving the location of the antenna a few inches often provides a better view of the sky.

15.2 SECURING THE EKP-IV

The EKP-IV was designed to be mounted on your leg for operation. This will put

the EKP-IV close at hand and in an easily visible location without interfering with other equipment.
Use the elastic strap provided to secure the EKP-IV to your leg. Position the elastic strap around your leg with the long looped strip on top. Fasten with the hook and loop closure at each end of the strap. Hold the EKP-IV over the strap on your leg and lower into place.
Press down a little to be sure the strips are secure. If you prefer there are after market mounts available for attachment to the yoke assembly or the seat rail tracks. Please contact your dealer for more details on these items.

NOTE

Yoke mounts may not be appropriate for your aircraft. Use care to ensure that the EKP-IV does not obscure the primary instruments.

15.3 DIMENSIONS

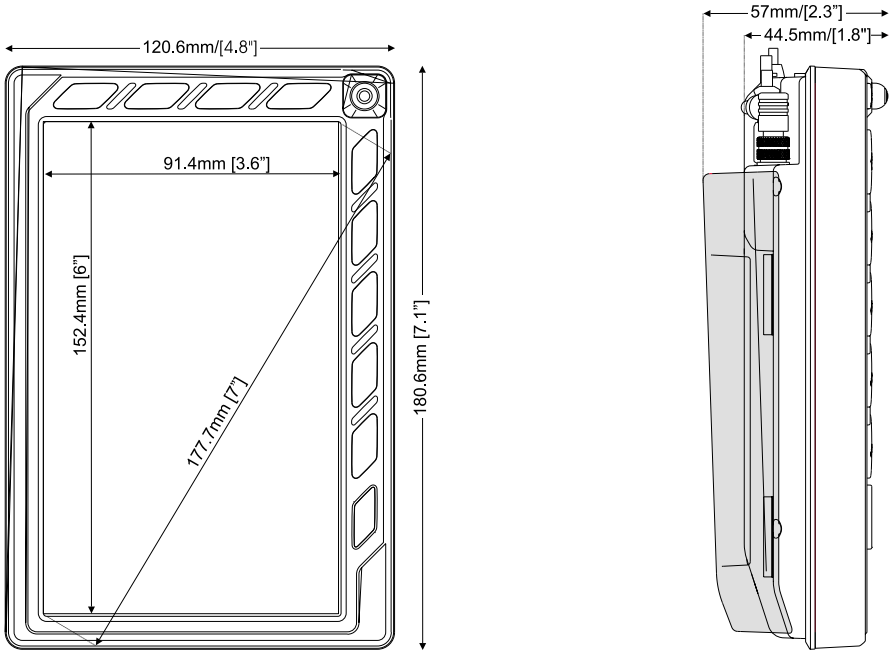


Fig. 15.3 - Dimensions

15.4 TROUBLESHOOTING

The following is a brief guide to some of the problems you may experience while using the EKP-IV with common solutions.

15.4.1 POWER

No Power — The power connections are loose or not fully engaged. Make sure all Power Cable connections are secure. Make sure the power supply is operating properly. Check the fuse located at the end of the cigarette plug. (To open unscrew the middle circle at the tip of the adaptor.)

15.4.2 GPS FIX

Position fix doesn't change — The signal from one or more satellites has been lost; the positioning information displayed is the most recent available.

Position fixes vary a lot — GPS accuracy is affected by several variables, the most prevalent of which are the geometric quality of the fix. Therefore, the specified accuracy of 15 Meters RMS in 2D is statistical, not absolute and assumes the absence of Selective Availability which was discontinued in April 2000.

The EKP-IV is not obtaining position fixes — If the EKP-IV is using an internal GPS Receiver, proceed to the GPS status screen:

> 'MENU' 1 sec. + "GPS PAGE" + 'ENTER'

Review the number of satellites in use. If zero, check that the antenna has a clear view of the sky and that the connections have been made properly. If less than four satellites are in use, the GPS receiver may have difficulty receiving a fix. Try repositioning the antenna. A GPS fix requires a minimum of three satellites and a poor Signal Quality on one or more satellites may preclude receiving a position fix.

Verify the user setting for Fix Source is listed as Internal GPS:

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER' + "FIX SOURCE" + 'ENTER' + "INTERNAL GPS" + 'ENTER'

If the EKP-IV is using an External GPS receiver, proceed to Fix functions screen:

> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FIX SETUP" + 'ENTER'

Verify that the Fix Source is listed properly (External NMEA) as indicated in the System Setup section (see Chapter 14) and that the Baud Rate is set correctly for your GPS receiver (the EKP-IV requires 9600- Baud Rate). Verify that the data cable connections are proper.

External device is not responding — The data port is not turned on or is not outputting messages in the correct format. Refer to the external device's user guide to determine the correct message format. Check the Installation Settings menu and make any necessary changes.

The EKP-IV may not be properly connected to the external device. Check all connections to be sure they are correctly made and secure.
Navigate feature does not work — Blanks are displayed in the navigation data fields until a GPS fix has been obtained; this usually occurs within a few Minutes. Also a Flight Plan must be active to display values for navigation-related information (such as Cross Track Error) and you must be travelling at least 2 Knots to display values for velocity-related information (such as GS). Activate a Flight Plan and/or increase your speed.
Fluctuations in positioning and navigation data — Small fluctuations in positioning and velocity-related navigation is normal.

15.4.3 WHEN NOTHING ELSE WORKS

The list above should allow you to solve most of the operating problems you are likely to encounter. Simply disconnecting the EKP-IV from power for a moment may solve your problem as well. If this does not help, try resetting the EKP-IV to the factory defaults:
> 'MENU' 1 sec. + "SYSTEM SETUP" + 'ENTER' + "FACTORY DEFAULTS" + 'ENTER'
If this does not help, you can try one additional memory clear option. This is a factory default RAM Clear that should only be tried after all other attempts have been made. When using the RAM Clear feature, you will loose all user stored information and the EKP-IV will default to factory settings. Before this step, you have the option of saving user Marks, Track history and Routes to a User Compact Flash (this is an optional purchase from your dealer). To perform a RAM Clear see Par. 15.5.1.

15.4.4 CUSTOMER SUPPORT

If you are unable to solve your operation problems, please contact C-MAP Aviation at 133 Falmouth Road Mashpee, MA 02649, 508-539-3115 or 800.363.2627, reporting the Software Release and Cartography information available in the About page.
>'MENU' 1 sec. + "About..." + 'ENTER'

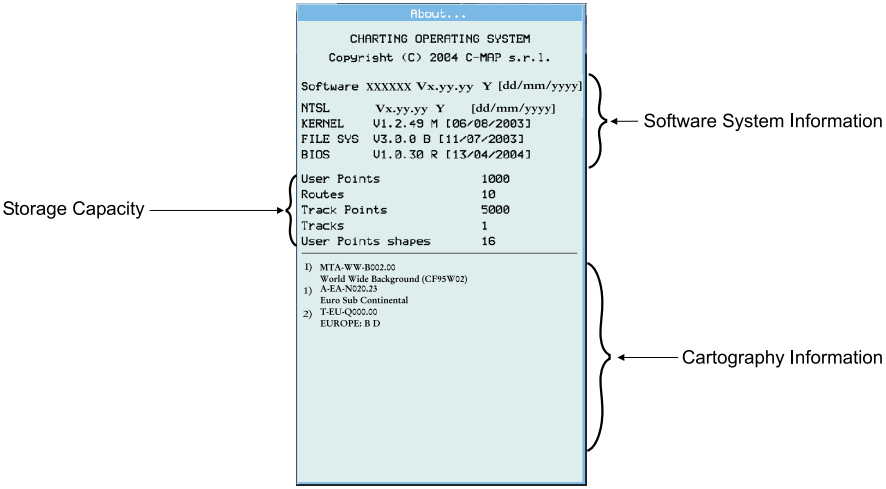


Fig. 15.4.4 - About page

If it is necessary to return your EKP-IV for repair, you must obtain a return authorization (RA) number from C-MAP Aviation prior to shipping the system. Include with the EKP-IV a description of the problem, your RA number, and your name and address. If your return shipping address is different, please include it. All packages are to be returned postage paid. As we are not responsible for packages in transit, we recommend you purchase insurance and tracking information.

15.5 SYSTEM TEST

If you have connected your EKP-IV according to the instructions and chosen the proper menu selections and are still having problems a RAM Clear will bring the system back to factory default settings. Many times this will clear the errors and bring the EKP-IV back to operating condition. RAM CLEAR can be found in the System Test Menu.

NOTE

The additional tests in the System Test Menu are intended for factory testing. Faulty findings within these menus is not necessarily a true result, as factory settings and equipment are often used during these tests.

15.5.1 RAM MENU

Make sure the EKP-IV is turned Off. While pressing and holding any other key, turn the EKP-IV On. A new menu will appear on the display. Use the

cursor key to select the RAM Menu and press 'ENTER' to select RAM Test or RAM Clear.

• **RAM Test**

'ENTER' on RAM Test to verify the integrity of the RAM. If the message "ERROR" appears the RAM is physically damaged.

• **RAM Clear**

'ENTER' on RAM Clear to to activate, press 'ENTER' again to confirm (at this time if you do not wish to clear RAM press 'CLEAR').
This operation will erase all Marks, Flight Plans, stored Track plots and destinations. It will also return all selections (Input Data Format, selective display etc.) to original default values.

15.5.2 C-CARD menu

To check the Compact Flash and its connector.

• **Compact Flash Test**

To test the Compact Flash. There are the following possible situations:

1. If there is a Compact Flash inserted in the slot and there is not a malfunction, the name of the Compact Flash zone and the message "OK" are shown.
2. If there is a Compact Flash inserted in the slot, but it is a damaged Compact Flash, the name of the Compact Flash zone and the message "Faulty" are shown.
3. If there is not any Compact Flash inserted in the slot, the message "not present" is shown.
4. If there is an User Compact Flash inserted in the slot, the message "USER CARTRIDGE" is shown.

• **C-CARD Connector**

Indicates if there is a malfunction in the connector. It is used only in production.

15.5.3 SERIAL PORTS

If you are having problems receiving data from the position-finding instrument, this test should help determine the problem.

• **Change Parameters**

To change the parameters of the serial interface. This menu allows to select the **Port** (Signal Source) between UART0 or UART1, the **Baud Rate** between 4800 or 9600, the **Data Bits** (Word Length) between 7 or 8, the **Parity** between EVEN, ODD or NONE, the **Stop Bits** between 1 or 2, the **Polarity** between "+" or "-". Default settings are: Port = UART1, Baud Rate = 4800, Data Bits = 8, Parity = NONE, Stop Bits = 1, Polarity = +.

• **Input Data Display**

To allow the chart plotter to act as a computer terminal and display the incoming data exactly as it received.

If the data displayed on the screen is unrecognizable, you may have selected the wrong input parameters for your particular receiver, for example, NMEA-0182 instead of NMEA-0183.
Check your receiver manual to be sure that you have selected the proper interface format. If the screen is blank, you may have a broken connection, and no data is being received.
Use 'ZOOM IN' to stop (or continue after pause) data displaying, 'ENTER' to show data in hex or ASCII mode (normal or small) and 'CLEAR' to exit.

Appendix A - Terms

This section explains the terms that you may find unfamiliar.

ACQUISITION Occurs when the EKP-IV locates a signal and collects data from a satellite.

AIRPORT DATABASE A series of files of airport positions (described near the geographical center of the airport and as defined by ICAO), with runways, frequencies (with sectors) and services available information. Based on the ARINC 424 format for Jeppesen's Database.

ALMANAC Data on the general location and health of all satellites in the GPS constellation. Can be collected from any available satellite in about 15 minutes.

ALT ALTITUDE - Height above mean sea level. Density Altitude and the Altitude computed by a GPS receiver may differ due to the effects of selective availability.

ARTCC AIR ROUTE TRAFFIC CONTROL CENTER

ATTENTION AREAS Areas in which special attention by the mariner is required, because of natural or man-made hazards, or sailing regulations and restrictions. Moreover a special symbol (!) is placed inside the area selecting On' or 'Contour' options. This is valid also for the categories: FISHING FACILITY, MARINE FARM/ CULTURE, MILITARY PRACTICE AREA, RESTRICTED AREA, SEAPLANE LANDING AREA. When the area is small, it is identified only by the boundary.

ATIS AUTOMATIC TERMINAL INFORMATION SERVICE - Recorded information about weather and other conditions at an airport, periodically updated when conditions change.

AUTOMATIC MODE The mode of operation that uses 2D or 3D, depending on the number of available satellites (preference is given to 3D; LAT, LON and ALT).

AUTOMATIC SWITCHING Flight Plans automatically switch from one leg to the next when the Waypoint is reached.

AUTO ZOOM (mode) The Auto Zoom mode is used to display fix position and destination (Target) always visible on the map. The map is scrolled and zoomed automatically to have the best view displaying fix and destination together on the screen. When this mode is active the cursor is hidden.

AWOS Automatic Weather Observation Station

AZIMUTH Bearing measured clockwise from true or magnetic north.

BATHYMETRIC LINES Imaginary lines connecting points of equal water depth.

BEACON An airport rotating beacon (white or white and green).

BISECTOR A straight line that divides an angle into two equal parts.

BRG BEARING - The horizontal direction of a destination or Waypoint measured in relation to true or magnetic north.

CDI COURSE DEVIATION INDICATOR - A graphical representation of Cross Track Error (XTE) showing distance left or right of course. An airplane icon indicates the direction of relative motion, toward or away from the intended Track.

COG COURSE OVER GROUND - Direction of the path over ground actually followed.

CONSTELLATION The satellites in the Global Positioning System (GPS). Positioned in six orbital planes approximately 11,000 NM above the earth.

COORDINATES A Latitude and Longitude position that corresponds to a specific point on the earth's surface.

COURSE The planned line of travel: the line between your start position and the destination.

CTAF Common Traffic Advisory Frequency - May be Unicom, Multicom or Tower Frequency.

CULTURAL FEATURES Any man-made topographic feature as built-up area, buildings, roads, ...

CURSOR (mode) In Cursor mode the screen is controlled by your movement of the cursor. When in Cursor mode, a data field line will appear under the Data Window providing LAT/LON of the cursor position. If a fix has been computed, a distance and bearing will also appear from the position fix to the cursor. In this mode it is possible to scroll on the map such that the position fix will not be displayed on the screen. When this occurs, you can quickly display your position by activating Home mode.

DATA WINDOW Data Window is an information panel representing customized data fields. The layout of these fields depends on the screen mode.

DATABASE A collection of data that can be accessed by the user for airports, VORs, NDBs, Intersections and User Waypoints.

DATUM A method of assigning position coordinates to real-world locations. Based on an underlying ellipsoidal model of the earth and subject to other scientific assumptions. Identified by a unique name, such as WGS84 or NAD27.
DEFAULT The value or setting automatically chosen by the EKP-IV unless directed otherwise.
DEGREE 1/360th of a circle. On a Great Circle, 1° = 60 min.
DGPS DIFFERENTIAL GPS - Provides even greater positioning accuracy than standard GPS.
DME Distance Measuring Equipment
ELEVATION Altitude above sea level (MSL). Usually refers to field Elevation of an airport. Also refers to a satellite's height above the horizon.
EPHEMERIS DATA Data on the specific location of a satellite that is collected from that satellite when it is first located and is
periodically updated while the satellite is being tracked. Remains current for up to 2 hours.
ETA ESTIMATED TIME OF ARRIVAL - The estimated time of day the destination Waypoint will be reached, based on your current speed and the distance to destination.
ETE ESTIMATED TIME ENROUTE - The estimated time needed to reach your destination, based on your current speed and the distance to destination.
FILE It is collection of information (of the same type) stored on a User COMPACT FLASH. Each file must have a unique name, ideally one that describes its contents. File names are kept in a directory on each User COMPACT FLASH.
FP FLIGHT PLAN - A planned course of travel, with one to twenty-five legs, each with its own origin and destination.
FP LEG The line connecting two waypoints within a Flight Plan.
FSS FLIGHT SERVICE STATIONS - Provide pilot briefings en route.
FUEL BURN RATE Fuel burn rate in a cruise configuration.
GLIDE SLOPE The desired descent path for Vertical Navigation.
GPS GLOBAL POSITIONING SYSTEM - A satellite based navigation system operated by the US Department of Defense. It operates 24 hours a day, 365 days a year under any weather conditions.
GQ GEOMETRIC QUALITY - A measurement of the geometry of the satellites used to triangulate the position. A low GQ is inaccurate and generates a GQ warning. Navigation data should be used with caution when the GQ warning appears.
GREAT CIRCLE Distance measured along the curved surface of the earth. Over long distances, a Great Circle distance is more accurate than a Rhumb Line distance measured from a mercator chart.
GS GROUND SPEED - The speed over the ground; can vary from air speed as it is affected by the prevailing winds.
HDG HEADING - The direction your aircraft is facing, defined as an angle from true or magnetic north.
HDOP HORIZONTAL DILUTION OF PRECISION - It is the index for position-fixing accuracy. The smaller the HDOP value, indicates a better position calculation.
HOME (mode) The Home (called also Screen Amplifier) mode is used to keep the fix position within the visible map. The map is scrolled and redrawn automatically when the fix position is moved. When this mode is active the cursor is hidden.
ICON A symbol shown on any display as a representation of a Waypoint .
IDENTIFIER An abbreviated name that is assigned to an airport or navaid. The identifier may be any combination of letters and numbers, up to five characters in length.
INT INTERSECTION - A Waypoint defined by any combination of courses or radials between two or more navaids. Enroute and terminal intersections are part of the EKP-IV Database.
KTS KNOTS - One Knot is a unit of speed equal to one Nautical Mile per hour.
LANDMARKS Any prominent object such as monument, building, silo, tower, mast, on land which can be used in determining a location or a direction
LAT LATITUDE - The distance north or south of the equator, measured in an arc with the equator being 0° and the poles being 90°.
LON LONGITUDE - The distance east or west of the Prime Meridian (0°), which intersects Greenwich, England. The range is 0°–180°E, moving east of 0° and 0°–180°W, moving west of 0°.
LORAN The Loran chains are groups of transmitting stations that use timed radio pulse transmissions.

MAGNETIC NORTH The migrating pole where the earth's magnetic lines converge. The north magnetic pole is some distance from true north at 76.1°N 100°W.
MARK Reference points related to cursor position.
MASK ANGLE The Elevation (height above the horizon, measured in Degrees) below which the EKP-IV will not search for satellites. The Mask Angle used by the EKP-IV is variable. It starts at 8° and under certain conditions, may drop as low as 0°.
MIN MINUTE - A unit of measure, equal to1/60th of one Degree of a circle.
MORA This Minimum Off-Route Altitude provides minimum altitudes for terrain and obstruction clearance within the section outlined by the Latitude and Longitude lines. Mora values clear all terrain and obstructions by 1,000' in areas where the highest terrain and obstructions are 5,000' MSL or lower. Mora values clear all terrain and obstructions by 2,000' in areas where the highest terrain and obstructions are 5,000' MSL or higher. Moras are not shown where there is no published data.
MOVING MAP The Moving Map is the default state of the software. This mode represents the Moving Map screen and Data Window.
MT METER - A metric distance measurement equal to 39.37 inches.
NATURAL FEATURES Any topographic feature formed by the action of natural processes: coastlines, relief, glaciers, ...
NDB NON-DIRECTIONAL BEACON - A low/medium-frequency navigation aid that sends non-directional signals that can be used for navigation.
NM NAUTICAL MILE - A distance measurement equal to 6,076 feet or 1.15 Statute Miles. Also equal to one Minute of Latitude.
NMEA NATIONAL MARINE ELECTRONICS ASSOCIATION - Professional organization that defines and maintains the standard serial format used by marine electronic navigation equipment and computer interfaces. NMEA format has been adopted by parts of the avionics industry.
OFFSET Distance away from desired course.
OSGB ORDNANCE SURVEY OF GREAT BRITAIN - A Coordinate System describing only Great Britain. Generally used with GBR36 datum, which also describes only Great Britain. This Coordinate System cannot be used in any other part of the world.
POSITION A location that is obtained in real-time and expressed as coordinates. Sometimes called a fix. Also a Waypoint location obtained from a chart or other source.
RECEIVER The electronic components of the EKP-IV that receive satellite signals.
RHUMB LINE A constant true Heading between a starting point and a completion point.
RMS ROOT MEAN SQUARE - A measurement of error that is: the square root of the average of the position errors, squared.
RTCM RADIO TECHNICAL COMMITTEE MARITIME - The data format created by the Radio Technical Committee Maritime (Special Committee 104) to transmit differential GPS corrections.
SA SELECTIVE AVAILABILITY - The degradation of the GPS data broadcast by the SPS (Standard Positioning Service), the U.S. Government discontinued the use of SA in April 2000.
SIMULATION Enables use of the EKP-IV without a GPS fix.
SM STATUTE MILE - A distance measurement equal to 5,280 feet or 0.87 Nautical Mile.
SOG SPEED OVER GROUND - A calculation of the rate of movement over the ground.
SPS STANDARD POSITIONING SERVICE - The civilian-access signal broadcast by the GPS satellites.
SQ SIGNAL QUALITY - An indication of the signal-to-noise ratio of each satellite signal being used. Ranges from 00 (lowest) to 99 (highest). A scale for indicating the strength of the signal and the likelihood of the lock on the signal being lost.
TCA TERMINAL CONTROL AREA - Class B airspace.
TPA TRAFFIC PATTERN ALTITUDE - The Altitude required when entering the traffic pattern.
TRACK The historical movement over the ground.
TRACKS & ROUTES Recommended and established routes for ships at sea, including traffic separation schemes, deep water routes.
TRUE NORTH Geographic north, located at the earth's north pole.
TTG TIME TO GO - The estimated time needed to reach your destination, based on your current speed and the distance to destination.

TWR TOWER FREQUENCY - The radio frequency for contacting the tower.
UNICOM UNICOM FREQUENCY - Used for general traffic advisories. Provides airport information for non controlled airports.
UTC UNIVERSAL TIME - The current time at the Prime Meridian. Abbreviated as UT or UTC. Also ref. to as Zulu time (Z)
USER COMPACT FLASH The EKP-IV uses the optional User COMPACT FLASH to save user data: it is a convenient medium to store and retrieve your information.
USER WAYPOINT Place on the chart identified by its coordinates and displayed on the screen with a reference symbol .
UTM Universal Transverse Mercator - Metric Grid system used on most large and intermediate scale land topographic charts and maps.
VDOP (Vertical Dilution Of Precision) VNAV Vertical Navigation - The actual path of the aircraft descending to a final destination. Provides descent point, Altitude and rate information.
VORTAC A navaid that provides a VOR, DME and TACAN at one site.
WAAS Wide Area Augmentation System - The Federal Aviation Administration (FAA), in cooperation with other DOT organizations and DOD, is augmenting the GPS/SPS with a satellite-based augmentation system, the WAAS. It will provide a signal-in-space to WAAS users to support en route through precision approach navigation. After achieving initial operational capability, the WAAS will then be incrementally improved over the next years to expand the area of coverage, increase the availability of precision approaches, increase signal redundancy and reduce operational restrictions.
WAYPOINT Any point to which one intends to navigate. A sequence of Waypoints makes up a Flight Plan.
WGS84 World Geodetic System 1984 Coordinates System or Datum developed by the Defense Mapping Agency (DMA).
XTE Cross Track Error - The perpendicular distance between the present position and the course line. Given as a distance right or left of course when facing the destination. Displayed in NAV as XTE or on the CDI as a deflection.
ZOOM IN Shows more detail in a smaller area.
ZOOM OUT Shows a wider area with less details.

Appendix C - Map Datum

A map datum is a mathematical description of the earth or a part of the earth and is based on the ellipsoid or the arc of an ellipsoid that most closely represents the area being described. In addition, the datum is centered at a specific location (the datum origin). A datum may describe a small part of the earth, such as California or Iceland or may describe the entire earth, such as WGS84, depending on which ellipsoid or ellipsoidal arc is selected.
Since datums use different ellipsoids and origins, the LAT/LON coordinates of the same position differs from one datum to another. The difference may be slight or great, depending on the datums involved, but will affect the apparent accuracy of the positioning information provided by a GPS receiver. GPS (and all of the EKP-IV cartridges) use the WGS84 datum, which is the model of the earth that is the closest possible average of the planet as a whole. Your chart datum is usually found in the legend. If the datum is not WGS84 means that position coordinates determined with the EKP-IV may not appear to agree with coordinates determined from a printed chart.

Appendix D - ICAO codes

The EKP-IV Database of airports is drawn from the system of ICAO (International Civil Aviation Organization) identifiers. Unlike the IATA (International Airline Transport Association) identifiers seen on charts and luggage

tags, the ICAO codes minimize the possibility of duplicate identifiers and allow pilots to identify an airport's region and nearby large city.

ICAO codes for international airports use a 2-character identifier for the region, followed by 1 character that identifies the airport's general area, then 1 character of the airport.

For example, the ICAO code for Melbourne, Australia is YMML (IATA code MEL). All of Victoria and Tasmania are in the YM region and the international airports in the Melbourne area start with "M". Therefore, Melbourne International Airport is YMML and the nearby Moorabbin Airport is YMMB.

In North America, the region containing Los Angeles begins with a "K" and the airport identifier of L.A. International Airport is "KLAX". Merrill Field in Anchorage, Alaska, begins with region code PA; its identifier is PAMR.

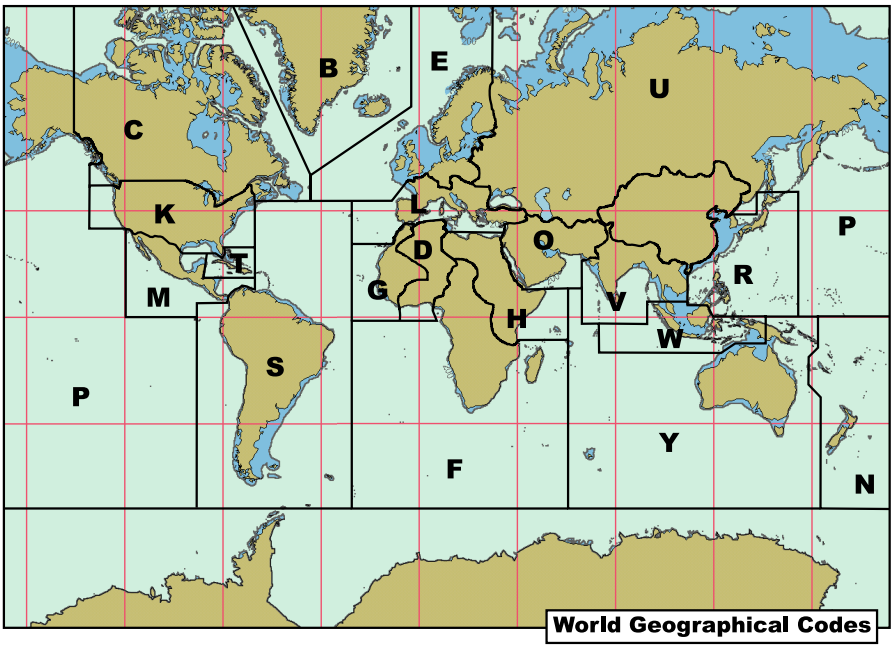
The ICAO codes for the hundreds of smaller airports around the world whose names include numbers are not preceded by a region prefix. For example, Barrie Executive Airport in Barrie, Ontario, Canada is NA3.

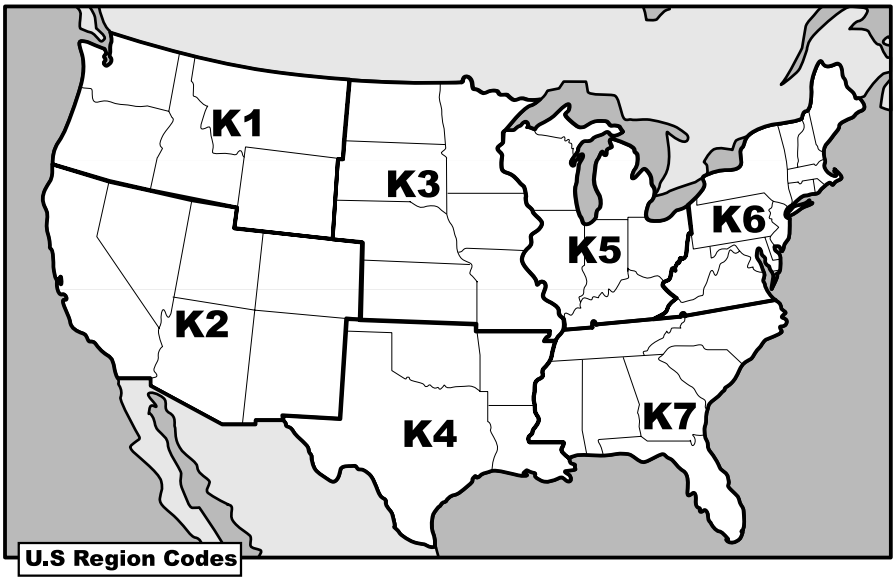
The following pages contain maps and a table of ICAO codes. The map of the continental U.S. contains the 2-character codes that identify the U.S. ("K") and the area (the following number). The world map shows the region codes only.

The ICAO codes in the table are 2-character codes; like "K2" and similar ICAO codes for the U.S., these codes identify both region (the first character) and a geographical area within the region (the second character). Where necessary, the geographical area or nearest nation
is also included in parentheses. Please note that these regions and nations are provided for loca-tion
only and do not necessarily indicate possession by the nation indicated. All areas are as
described by the standard ARINC 424 format.

A list of worldwide ICAO codes is also available in book form from the International Civil Aviation Organization. Ask for *ICAO Location Indicator*s, document number 7910/70.

Document Sales Unit - International Civil Aviation Organization
1000 Sherbrooke Street West - Suite 400
Montreal, Quebec - Canada H3A 2R2
Tel. 1 (514) 285-8219





U.S Region Codes

ICAO CODE	NAME
A1	Antarctica (Aus/NZ)
BG	Greenland
BI	Iceland
CF	Miquelon Island/St Pierre Island (Canada)
CY	Canada
DA	Algeria
DB	Benin
DF	Burkina Faso
DG	Accra/Ghana
DI	Ivory Coast
DN	Nigeria
DR	Niamey/Niger
DT	Tunisia
DX	Togo
EB	Belgium
ED	Germany
EE	Estonia
EF	Finland
EG	Shanwick Oceanic/United Kingdom
EH	Netherlands
EI	Ireland
EK	Denmark/Faroe Islands
EL	Luxembourg
EN	Norway
EP	Poland
ES	Sweden
ET	Germany
FA	Bophuthatswana/Ciskei/ Johannesburg/Namibia/South African Republic/Southwest Africa/Transkei/ Venda

ICAO CODE	NAME
FB	Botswana
FC	Brazzaville/Congo
FD	Swaziland
FE	Central African Republic
FG	Equatorial Guinea
FH	Acension/St. Helena
FI	Mauritius
FJ	British Indian Ocean Tr/Chagos Archipelago
FIC	Cameroon
FL	Zambia
FM	Antananarivo/Cormors/Madagascar/ Mayotte Island/Reunion
FN	Angola
FO	Gabon
FP	Sao Tome and Principe
FQ	Mozambique
FS	Seychelles
FT	Chad/N'Djameno
FV	Zimbabwe
FW	Malawi
FX	Lesotho
FZ	Zaire
F1	Antarctica (Afr.)
GA	Mali
GB	Gambia
GC	Canary Islands
GE	Melilla
GF	Sierra Leone
GG	Guinea-Bissau
GL	Liberia/Roberts
GM	Dakhla and Laayoune/Morocco

ICAO CODE	NAME
GO	Dakar/Dakar Oceanic/Senegal
GQ	Mauritania
GU	Guinea Republic
GV	Cape Verde/Sal Oceanic
HA	Ethiopia
HB	Burundi
HC	Somalia
HE	Egypt
HF	Djibouti
HK	Kenya/Nairobi
HL	Libya
HR	Rwanda
HS	Sudan
HT	Tanzania
HU	Uganda
K1	USA; Idaho, Montana, Oregon, Washington, Wyoming
K2	USA; Arizona, California, Colorado, Nevada, New Mexico, Utah
K3	USA; Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
K4	USA; Houston Oceanic Control Area, Arkansas, Louisiana, Oklahoma, Texas
K5	USA; Illinois, Indiana, Kentucky, Michigan, Ohio, Wisconsin
K6	USA; New York Oceanic Control Area, Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia
K7	USA; Miami Oceanic Control Area, Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee
LA	Albania
LB	Bulgaria
LC	Cyprus/Republic of North Cyprus
LE	Spain
LF	France
LG	Greece
LH	Hungary
LI	Italy
LK	Czecho Republic
LL	Israel/Jerusalem
LM	Malta
LO	Austria
LP	Azores/Madeira Island/Portugal/Santa Maria Oceanic
LQ	Bosnia and Herzegovina
LR	Romania
LS	Switzerland
LT	Turkey
LX	Gibralter
LY	Yugoslavia
LZ	Slovakia
MB	Caicos Islands/Turks Islands
MD	Dominican Republic

ICAO CODE	NAME
MG	Guatemala
MH	Honduras
MK	Jamaica
MM	Mexico
MN	Nicaragua
MP	Panama
MR	Costa Rica
MS	El Salvador
MT	Haiti
MU	Cuba
MW	Cayman Islands
MY	Bahamas
MZ	Belize
NC	Cook Islands
NF	Fiji Islands/Tonga
NG	Kiribati/Tuvalu (S. Pacific)
NI	Niue (S. Pacific)
NL	Futuna Islands/Wallis Islands
NS	American Samoa/Western Samoa
NT	French Polynesia/Society Islands/ Tuamotu Islands
NV	Vanuatu
NW	New Caledonia
NZ	New Zealand
OA	Afghanistan
OB	Bahrain
OE	Jedda/Saudi Arabia
OI	Iran
OJ	Jordan
OK	Kuwait
OL	Lebanon
OM	United Arab Emirates
OO	Oman
OP	Pakistan
OR	Iraq
OS	Syria
OT	Qatar
P	Oakland OCTA
PA	Alaska
PC	Kiribati
PG	Guam/Mariana Islands
PH	Hawaii
PJ	Johnston Atoll
PK	Marshall Islands
PL	Kiribati
PM	Midway Island
PT	Caroline Islands/Micronesia/Palau
PW	Wake Island
QY	Yemen Arab Republic
RC	Taiwan
RJ	Japan
RK	Korea
RO	Japan
RP	Philippines
SA	Argentina
SB	Brazil
SC	Chile/Easter Island
SE	Ecuador
SF	Falkland Island
SG	Paraguay

ICAO CODE	NAME
SK	Colombia/San Andres
SL	Bolivia
SM	Suriname
SO	French Guiana
SP	Peru
SU	Uruguay
SV	Venezeula
SY	Guyana
S1	Antarctica (Argentina, Chile)
TA	Antigua
TB	Barbados
TD	Dominica
TF	Guadeloupe/Martinique
TG	Grenada
TI	Virgin Islands
TJ	Puerto Rico
TK	St. Kitts/Nevis Island
TL	St Lucia
TN	Aruba/ Netherland Antille
TQ	Anguilla
TR	Montserrat Island
TT	Tobago Island/Trinidad
TU	British Virgin Islands
TV	St Vincent
TX	Bermuda
UA	Kazakhstan/Kyrgyzstan/USSR
UB	Azerbaijan/USSR
UE	Russia/USSR
UG	Armenia/Georgia/USSR
UH	Russia/USSR
UI	Russia/USSR
UK	Moldova/Ukraine/USSR
UL	Russia/USSR
UM	Belarus/Latvia/Lithuania/Russia/ USSR
UN	Russia/USSR
UO	Russia/USSR
UR	Kazakhstan/Russia/USSR
US	Russia/USSR
UT	Kazakhstan/Tajikistan/Turkmenistan/ USSR/Uzbekistan
UU	Russia/USSR
UW	Russia/USSR

ICAO CODE	NAME
VA	India
VC	Sri Lanka
VD	Kampuchea
VE	India
VG	Bangladesh
VH	Hong Kong
VI	India
VL	Laos
VM	Macau
VN	Nepal
VO	India
VQ	Bhutan
VR	Maldives
VT	Thailand
VV	Vietnam
VY	Myanmar
WA	Indonesia
WB	Brunei/Malaysia
WI	Indonesia
WM	Malaysia
WP	Indonesia
WR	Indonesia
WS	Singapore
YB	Australia
YD	Australia
YG	Solomon Islands
YM	Australia
YN	Nauru (South Pacific)
YP	Australia
YS	Australia
YY	Papua/New Guinea
ZB	China, Peoples Republic of
ZG	China, Peoples Republic of
ZH	China, Peoples Republic of
ZK	Korea, Democratic Peoples Republic of
ZL	China, Peoples Republic of
ZM	Mongolia
ZP	China, Peoples Republic of
ZS	China, Peoples Republic of
ZU	China, Peoples Republic of
ZW	China, Peoples Republic of
ZY	China, Peoples Republic of

Appendix E - C-MAP Aviation Cartridge Options

The EKP-IV displays land cartography and navigational data from C-MAP data cards. The system is designed with land cartography internal to the hardware and two Compact Flash slots for additional external data. Following are the data options for the EKP-IV.

CONTINENTAL NAVDATA

Jeppesen Database including airport, VOR, NDB, Intersection and airspace information.

SUB-CONTINENTAL

These Compact Flashs combine Jeppesen Navdata and land cartography for those customers traveling outside The Americas to provide users with worldwide coverage.

REGIONAL CARTOGRAPHY
You can enhance the level of detail found in the internal memory with regional Compact Flashs. The additional street and lake information provides more detail and increased accuracy of the land cartography on the lower zoom levels of the unit.
CUSTOMIZED REGIONAL COVERAGE AREA
C-MAP's customized regional coverage option can provide you with the opportunity to create a Compact Flash centered around your home town. Actual coverage area will be determined by the amount of detail in your area.
NAVDATA UPDATES
Updates to the aviation Database cartridge are provided through C-MAP Aviation. Cartridges are updated on a 28-day cycle and consist of data compiled from Jeppesen and other sources. Subscriptions are available for three and six time per year updates. Please contact C-MAP Aviation for pricing and availability.

Appendix F - C-MAP Data Transfer

The bi-directional data port outputs and inputs NMEA Data. NMEA messages sent/received at 48004N1, are defined as follows:
APA Autopilot Sentence "A" contains navigation receiver warning flag status, cross-track-error, Waypoint arrival status and initial bearing from origin Waypoint to the destination Waypoint for the active navigation leg of the journey.
APB Autopilot message contains all of the above plus: heading to steer toward destination, bearing from the present position to the destination (magnetic or true).
BOD Bearing Origin to Destination.
BWC Bearing and Distance to Waypoint.
GGA GPS position, time, fix quality, number of satellites used, height of antenna, HDOP (Horizontal Dilution of Precision), differential reference information and age.
GLL GPS-derived Latitude, Longitude and time of fix.
GSA GPS receiver operating mode, satellites used in the navigation solution reported by the $— GGA sentence and DOP (Dilution of Precision) values.
GSV Number of satellites in view, satellite numbers, elevation, azimuth, and SNR value.
HDG Heading, Deviation & Variation.
HDM Heading Magnetic.
HDT Heading True.
HSC Heading Steering Command.
PCMPA C-MAP Proprietary Sentence "A" contains Time, Fix Latitude/Longitude, SOG, COG, Date. For more information contact your local dealer.
PCMPT C-MAP Proprietary Sentence used to transfer Track history data and all additional information ssociated to the Track. For more information contact your local dealer.
RMA Recommended Minimum Specific Loran-C Data.
RMB Data status, Cross Track Error, direction to steer, origin, destination Waypoint, Waypoint location, bearing to destination and velocity toward the destination.
RMC Time, Latitude, Longitude, Speed Over Ground, Course Over Ground and date.
RTE Routes RTE - Routes.
VHW Water Speed and Heading.
VTG Course Over Ground & Ground Speed.
WCV Waypoint Closure Velocity
WPL Waypoint Location.
XTE Cross-Track Error
For information about the NMEA format specifications:
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